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IN THIS ISSUE

As in previous years, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is devoting the August number to shop utilities which have been found helpful by teachers of school shops. Among the articles presented this year, are several that have admirably answered the purpose in the shop in which they were originated. They may be found as helpful in others. Of course, in many cases, the ideas may not be acceptable at all. They may, however, suggest an idea that may be workable. If this is accomplished, the value of the issue will be great indeed.

Besides these shop utilities, the teacher-student in the summer school has been borne in mind and such articles as "Criteria of Curriculum Construction," by Burl N. Osburn; "Printing Education in America — I," by Chester A. Lyle; "Straight Thinking About Integration," by Jesse E. Rathbun; "Aviation in the High School," by J. W. Giachino; "A Useful Publicity Program," by D. W. Castle; "The Silent Teacher," by Delmar Olson and Wm. L. Hunter, and "Points for Personal Analysis," by L. M. Roehl, will be found exceedingly helpful.

Then there is the handicrafts instructor at the summer camp who may need new suggestions. He will find the four articles "Atwood's Championship Monoplane," by Terence Vincent; "Slab Furniture," by W. Ben. Hunt; "Coloring and Finishing Copper and Brass," by Wilbur C. Getz, and "Indian Necklaces," by W. Ben. Hunt, worthy of perusal.

A REMINDER

Have you informed the circulation department of The Bruce Publishing Company of your intended change of address? Do so now, so as not to miss coming numbers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

THIS MONTH'S COVER

The cover picture this month, shows students of the State Teachers College, California, Pa., working in the foundry. S. L. Coover is the director of the industrial-arts department at that school.

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."
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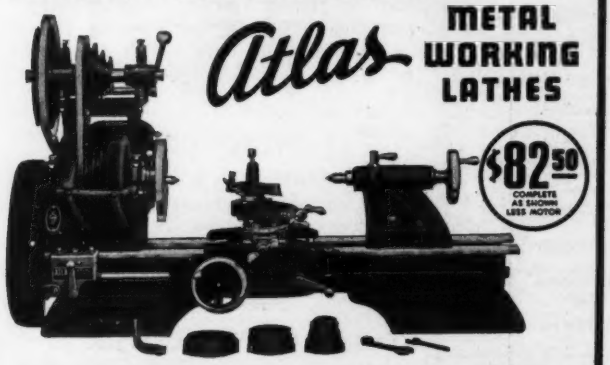

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REMCO MOTOR DRIVE

August, 1936
Vol. 25, No. 8

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Criteria of Curriculum Construction

Burl N. Osburn

State Teachers' College, Millersburg, Pennsylvania

The criteria here set up will be of inestimable value to anyone confronted with the problem of curriculum construction or reconstruction.

Since its introduction, industrial arts, apart from that which dealt specifically with vocational trade training has pursued many aims. Through all of the confusion which characterizes its present-day goals, one may see, slowly emerging, a rather clear recognition of one constant value: that of *preparing the individual to understand and effectively participate in the industrial civilization in which we live.*

In the elementary-school area this philosophy has seen splendid development under the leadership of the late Dr. Bonser, and others who are carrying on this type of work. Food, shelter, clothing, records, utensils, and tools and machines are studied in an integrated curriculum which breaks sharply with the traditional forms of education. To date, there is but little attempt to carry this same philosophy into practice in the secondary schools. One can make no valid line between one grade and another, one school level and another, or between the needs of different pupils, and say with supportable argument that if the philosophy just stated, is good for one it should not be good for the other. On the contrary, there seems every reason to believe that just as history, geography, and other subjects are developed on one level to the capacity and interest of the pupils of that level, then repeated with emphasis on those aspects which could not have been understood at an early age, so should the study of man's efforts to maintain an abundant material life be developed in much the same manner.

The elementary and intermediate grades deal in general with projects involving the home, the farm, certain types of occupations, with historical studies, and the source of commercially used products. It seems entirely logical that in the secondary schools these things should be more completely developed with increased emphasis on a study of industry and its products. Industry, for purposes of such a study, should not be interpreted to mean only the factory, mass production, or power-driven machinery. It should mean, rather, man's entire effort to deal with materials from their natural state to the limits of their production and intelligent use.

Assuming the need today for a study of industry and of one's relation to the industrial world it becomes necessary to examine the conditions under which such study may be effectively carried on. Of necessity any attempt to prescribe these conditions must be largely subjective. Such conditions or criteria must be stated in sufficiently general terms to permit their wide application. They should, however, have enough clarity to insure their being used as a guide for the future developing of a complete program of study.

Everyone who attempts to develop curriculum material is faced with the necessity for setting up some sort of constant, or "frame of reference" to which he may look for the necessary element of consistency or of unity of direction.

The analysis which follows is an attempt to define certain plans which seem to provide those conditions under which the major goal of industrial intelligence may be achieved. It is obvious that such a list of criteria can be only a tentative one, subject in all detail to the results of research. Its field of application is the secondary school, presupposing, by preference, an elementary-school program in which an integrated, or well-correlated curriculum has been the basic procedure. It should be understood that not all of these criteria can be applied to every area, or at every age level.

For purpose of analysis these criteria have been divided into three large groups. First, those which have to do directly with the interpretation or understanding of industry; second, those pertaining to the psychological and muscular development of the individual; and lastly, those which are directly concerned with the application to the curriculum.

Industrial Interpretation Values

The curriculum should:

1. *Represent as wide a range of areas of production as practical school conditions will permit.* So far as limitations of time, and facilities will permit, each of the major industrial areas should be considered. This may be a classification of food, clothing, shelter, etc., or on some other basis such as textiles, ceramics, metals, etc. If the scope is adequate, the classification is not necessarily important.

2. *Illustrate the basic methods employed in each of these for the shaping of materials.* In order to understand intelligently the ways by which articles of common use are produced, the school should embody in its curriculum each of the basic methods involved in the making of various types of production. For example, casting, throwing on the wheel, pressing, jigger work, blowing, etc., should all be represented as essential methods of the ceramic industries. In the field of graphic arts the basic methods of letterpress, planographic, and intaglio processes should be included since each represents a very important industrial method. Other industrial divisions might be analyzed in much the same manner.

4. *Provide for contacts with a wide range of materials important to each area.* Contact with many kinds of materials becomes necessary in carrying out the philosophy of developing industrial intelligence. Those materials with which the individual has more frequent contact and those which require

more training for intelligent use probably should have most attention.

5. *Include an example of the division of labor in quantity production.* The plan of division of labor is basic to modern production methods, hence as the school laboratory is to give an understanding of this fact it should at some place in its program illustrate this method of operation. It is not necessary or even desirable that the actual conditions of the factory be introduced.

6. *Include an example of production on an individual handicraft basis.* Closely related to the preceding criterion is the method of production in which one individual produces most or all of a given product, performing a variety of types of operations. Since this is common to earlier methods of production as well as to a number of modern industries, it is essential that it should be included. At present most schools practice this method almost exclusively. There are psychological results of unquestioned value in the satisfaction resulting from successful efforts in this direction.

7. *Provide for an understanding of the elements of systems of measurement common to the production areas represented.* As a consumer one has constant reason to utilize many types of measurement, of electrical energy, volume, area and length, etc. It is only by practice that one gains a concept of the production measured by these various systems. Vocationally the value of a working knowledge of these systems of measurement and of the instruments which they employ is of unquestioned value.

8. *Provide practice in the means by which man protects himself from injury and occupational disease.* Not only should the individual be able to protect himself from injury and know how to maintain health under various occupational conditions but he should be aware of the larger social responsibilities in these constant dangers.

9. *Provide for developing an attitude of intelligent critical analysis of quality and quantity of consumer goods.* Although only a very small proportion of consumer goods may actually be examined under school conditions it may be possible to develop an intelligent attitude toward such tests and to provide practical information on sources of information about many other products. The term "consumer goods" should not be restricted to mean materials destroyed in use, as foods, but should include all products of any sort.

10. *Provide practice in identifying methods employed in the production of goods, as evidenced by the appearance of the finished product.* There are in many instances certain evidences of methods of production shown by the appearance of a finished product. The basic methods of production may in many instances enable the individual to better understand the worth of products by knowing the way in which they were produced. For instance, many cast-iron products are often produced with deceptive marks designed to make them appear to have been produced by forge work from wrought iron. An understanding of foundry methods may enable the buyer to detect the falsity.

11. *Provide for interpreting the source, principles, and application of the basic sources of power.* Since power is so essential to modern production its study should include all of the basic sources from which it is derived. The laboratory should make use of electrical power, steam, water power, and the combustion engine, in order that their use and management may be better understood. Electricity, for example, should be studied in its application to power, heat, and light, communication, and other classes of uses.

12. *Illustrate how waste is utilized.* The utilization of waste products has become one of the important factors in modern industrial production. The school laboratory can well afford to make practical application of this very desirable attitude, as well as the conservation of material resources.

13. *Show how some modern tools came to be.* One's appreciation of modern tools and machines is much greater and more intelligent if there is some knowledge of their history and development. This includes a study of inventions.

14. *Interpret forces affecting style and design of consumer goods.* To the untrained person many articles of common use have little significance beyond their application to everyday life. One's understanding of their design and style may be greatly widened by knowing something of the forces, both historical and material, which have combined to bring about the present form of the article. For instance:

"The student who has learned to know styles in furniture, architecture, rugs, silverware, china, and other objects of common use is prepared to surround himself with those things which an integrated taste tells him can supply lifetime satisfaction. One who knows the various forces — racial, individual, symbolic, material, national, etc. — which have entered into the making of the common articles of everyday use is stimulated constantly to fuller enjoyment of those things and is keenly interested in the source and direction of those forces. Through recognizing the significance of the material heritage, the school establishes a closer relationship between its program and the enduring contributions of all time."*

15. *Give practice in the principles of organization whereby man works with his fellowman.* Much of the effectiveness as well as the controversies of modern production arise from the manner of organization of industry. The school laboratory gives an opportunity for carrying into practice some of those methods which are of common practice in industry, usually through some form of personal organization.

16. *Provide for experiences having immediate and retainable values in the optimum maintenance of the home.* The extent to which the modern family maintains the physical plant in which it is housed has changed radically during the past few decades. It is still desirable that it should be able to keep up the smooth operation of the increasing number of mechanical appliances in common use. Much of the training for this must be carried on under school conditions.

Psycho-Muscular Values

1. *Provide situations whereby the individual becomes habituated in being alert in the presence of working parts of a mechanism.* It seems desirable that the individual should be trained to recognize slight changes in the sound or action of working machinery. For instance the car driver who quickly detects change in the working or sound of his motor is in a position to handle the possible difficulties that may arise with greater intelligence. The same idea may be applied to many appliances about the home, in the factory, or on the street.

2. *Provide for the production of goods having commercial values on a par with a similar marketed product.* There is a very real psychological value in the satisfaction of producing a fine piece of work. If the product of one's work is as good as, or better than that of a similar product on the market, the result is generally one of increased self-confidence. The school laboratory should make it possible for individuals to achieve this goal frequently.

3. *Provide for developing approximately an artisan degree*

*A Prospectus for Industrial Arts in Ohio, Chapter 5.

of skill in some unit of work. It is only by first-hand knowledge of the discipline incidental to developing skill that one is able to appreciate the value of many products which he handles. It is very desirable that every individual develop a considerable degree of skill in some unit of work. For one this may be a very simple unit operation; for another it may be a wide range of skills which, combined, may be of commercial value. The extent or range will vary with the individual, but the psychological value of developing that skill will be present in every instance.

4. *Provide for developing an appropriate degree of skill in the various industrial areas represented.* It is neither possible nor desirable that the school attempt to develop an artisan degree of skill in all of the types of work which is included in its curriculum. The degree of skill in most of them will be dependent upon the results necessary to achieve the immediate goal.

5. *Provide for meeting age levels and types of interests.* The curriculum should be so designed that various types of interests are developed. The school has probably devoted most of its attention to making articles for household use, whereas this is only one of many kinds of interests which should be included in its activities. The range of interests at any one age level is much greater than the variation between age levels.

6. *Provide opportunity for self-appraisal.* It is very desirable that wholesome conditions for appraisal of one's own work or that of his fellows should be provided. There are qualities of judgment which may be trained and which are common to a great many life situations.

7. *Provide for some work requiring close conformity to fixed directions and standards.* Much of the work of the industrial world recognizes the unquestioned conformity to fixed standards and imposed methods. To be consistent with the major premise, this should be a part, at least, of school work. One who deals with secondary-school pupils finds relatively little development of ability in this direction.

8. *Provide for work for which pupil planning and criticism is the only source of direction and judging.* One's own initiative is necessary in successfully meeting many of the requirements of modern life. The school should provide situations in which this desirable practice may be developed.

Pedagogical Values

1. *Provide for teaching correct names and processes in all areas.* The necessity for this criterion is obvious.

2. *Provide for relationships with organizations sponsoring personal-social development.* The development of desirable personal-social qualities is without doubt one of the major goals in school activities. Other organizations besides the school which are engaged in the same activity may be called upon to aid the school in this kind of work.

3. *Provide for integration or close correlation with other areas of the school.* In order to enrich its activities to a greater extent it is desirable that the school laboratory maintain very close correlation with other areas of the school. It may serve as the center of those integrated activities which are classed as manufacturing and mechanical pursuits, and at the same time may serve as a marginal area for projects arising in other divisions of the school.

4. *Include activities initiated both by the pupils and by the teacher.* The major portion of the planning of activities naturally is carried on by the teacher. There should be provision for fitting into this plan, activities which are initiated by pupils, particularly those which carry out the major trends of the course of study.

5. *Provide for interpreting the finest design possible in every project.* The desire to produce results in one's work which may be as beautiful as possible should be instilled from the first. No product should be allowed to pass the approval of the individual or of the class unless it has incorporated all of the best that is known about the construction and the finest that can be developed in its design.

6. *Provide for measuring the results of teaching.* This criterion is necessary in order that the element of chance in results may be eliminated insofar as possible. It should be recognized, at the same time, that it can be overdone.

7. *Provide learning situations resulting in relatively immediate application.* The school should recognize that the individual is living for the present as well as preparing for later life. The activities in which it participates should be those which are on the age level of its members as well as of that kind which prepare for adulthood.

8. *Provide for the democratic selection of curriculum content.* This criterion, which applies to the method of organization of the curriculum, should be applied in order that it may be a wholesomely developed piece of work rather than one which is imposed from administrative heads. The trend in curriculum construction is very decidedly in the direction of a democratic development.

9. *Provide opportunity for determination and evaluation of unique ability and acquired knowledge and skills.* It is desirable that every opportunity be employed and every scientific tool used to analyze the unique abilities and the acquired knowledge and skills of every pupil. The accumulated records of tests and of the kind and quality of regular school activities are of great value in the better guidance of the school pupil.

Printing Education in America—I

Chester A. Lyle

Canton, Ohio

The first part of an interesting survey of the growth of printing education in America under public, private, commercial, labor, and industrial auspices.

To understand the progress that printing education has made on the North American continent one must contrast the situation previous to the opening of the present century with that of today. At that time, there was no system of instruction, no textbooks, no literature of the printing art available to the beginner. The beginner had to depend upon himself to learn the fundamentals of the trade. If the employer or one of the journeymen took an interest in the learner, he advanced through the stages of running errands, sweeping floors, and putting away leads and slugs, to some instruction in typesetting, stonework, or presswork.

Today, how different! There are twenty-four colleges offering courses, a number of them awarding a bachelor of science

degree in printing. Besides this, instruction in printing is given in vocational, technical, high, plant, special, and normal training schools. A conservative estimate places the number of such schools between 2,500 and 3,000. From a questionnaire sent to 1,444 schools offering printing, 388 replies were received from schools located in 38 different states, the District of Columbia, and Canada. These replies revealed the following statistics:

Schools of all types reporting	388
Number of teachers	670
Total enrollment for 1933	50,306
1933 graduates (from all types of courses)	23,179
Value of printing equipment	$3,999,619
Number of different textbooks in use (not including United Typothetae of America and International Typographical Union Apprenticeship Lessons)	39
School with reference libraries	253
Schools observing Printing-Education Week, 1933	170
Schools with local advisory committees	71

While 23,179 students completed prescribed printing courses of various types in the 388 schools, it is likely that more than 10 per cent actually entered the industry as mechanical workers. These are the graduates of vocational schools, technical high schools, and plant schools. Three hundred and sixty finished from the colleges and will feed into the office, field, minor executive jobs, and teaching positions.

Hand composition, platen presswork, and elementary pamphlet binding are taught with varying degrees of emphasis in all printing schools. These are the basic shop courses. Schools that are not preparing directly for the industry, such as elementary, junior, and senior high schools (academic) go no further in practical instruction. Instruction in machine composition and in cylinder presswork is continued in vocational schools and colleges that prepare for the industry.

The findings of this questionnaire reveal these further facts which give sufficient statistical information to show:

1. That printing instruction is offered in all types of schools starting in the elementary grades and going through the university and that 60 per cent of the schools are on a four-year high-school level or above.

2. That another 30 per cent of the schools are of the junior-high-school level, giving prevocational instruction to 24,461 pupils, almost one half of the total enrollment of 50,306 of the 388 schools.

3. That printing is gradually disappearing from elementary schools, except in the newer progressive schools, usually conducted under private enterprise, where printing is taught for its fundamental educational values.

4. That there is little possibility of overcrowding an industry which normally employs a large number of skilled craftsmen, office, and field men, when in a fruitful year for vocational education only 8,080 were enrolled in the leading schools that prepare directly for the industry, and when the actual number of graduates from such schools for the year 1933, as revealed by the survey, was 1,724.

5. That executive training for the industry and teacher training for the schools of printing are making adequate headway is evident from the report that 24 accredited colleges gave instruction to 1,856 students and graduated 360 in the year 1933.

6. That the printing industry has an abundantly fertile field to teach the appreciation of printing to future buyers and users of the printed product when almost 40,000 of the total enrollment of 50,306 were enrolled in printing schools of nonvocational and prevocational levels.

The Beginning of Printing Instruction in the Schools

Glancing back we find that as early as 1828, a school newspaper, "The Disseminator," was issued and printed by the boys of the New Harmony, Ind., school. The first city to put printing in the public schools was Indianapolis, Indiana, in 1887. The North End Union School of Printing was established in Boston, Mass., in 1900, through the conviction of Mr. Samuel F. Hubbard, superintendent, that the practical solution of the problem of trade education could only be obtained through a properly balanced co-ordination of school and workshop.

Wentworth Institute was incorporated under the laws of Massachusetts in 1904 for the purpose of furnishing education in the mechanical arts. It was endowed by Arioch Wentworth with a sum amounting now to something over $5,000,000. It began operations in 1911, since which time it has trained 36,274 men of whom 4,077 were soldiers and sailors in the world war. It is located on Huntington Avenue in Boston, Mass. While other trades are offered, the printing course is a vital part of the program. One-year and two-year day and evening courses are offered. The courses furnish a practical shop training and lay a foundation for good craftsmanship. The annual charge for the day course is $150. Since the opening of the school about a quarter of all the applicants have been rejected due to the high admission requirements. Only those are accepted whose temperament and capacity lead the officials to believe that it would be wise for them to choose a printing career. John Mansfield heads the Printing Department.

The Chicago School of Printing in Chicago, Ill., was organized in 1913. Here apprentices regularly employed in the trade are instructed in the technical operations as they apply to the trade. Attendance is compulsory. The employer pays all the operating expenses hoping to get more efficient workmen by sending his apprentices to be instructed there.

President S. J. Vaughn of the Colorado Women's College, Denver, Colo., claims to be the first man to establish a teacher-training course in printing. He bought the equipment for the Northern Illinois Teachers College in DeKalb, Ill., in 1910. A year later he wrote the first treatise on printing for schools.

The magazine, *The Inland Printer*, offered the first organized lessons on apprenticeship which was later developed by the International Typographical Union.

The United Typothetae of America is to be given credit for the extensive trade literature for instructional purposes, and the impetus given to the training in the shop, office, and school. Organized in 1887, it gave its attention to the discussion of apprenticeship as its first vital question. Twenty-four years later, October, 1911, definite steps were taken to solve this problem. Much credit is due Dr. Frederick W. Hamilton, former president of Tufts College, who with Chairman Henry P. Porter, did the pioneer work, not only for printing, but also for the industry in general. This was done in co-operation with the National Industrial Conference Board. The first task which confronted the Committee on Education of the United Typothetae of America was to develop text material on the apprenticeship level. This committee planned to publish a library of 65 volumes, 44 of

which have been completed. They next prepared graded lesson material covering fundamental processes in hand and machine composition, presswork, and binding operations which have become the standard text material in most schools of printing that have been established in this country and in Canada. Later this material was changed to standard books on printing, on elements of composition, imposition, advanced typography, linotype mechanism, and practical proofreading. In order to meet the demands of the printing industry, courses in accounting, advertising, cost finding, estimating, and salesmanship also were devised.

A résumé of what is being done in some of the leading universities, colleges, and schools of today seems necessary in order to give a clear insight into the progress printing education has made.

Carnegie Institute of Technology

Unquestionably the leading technical college on the North American continent teaching printing is the department of printing of the Carnegie Institute of Technology of Pittsburgh, Pa., established in 1914. During the twenty years of its existence it has occupied an important place in the field of printing education in the United States. Harry L. Gage, now vice-president of the Mergenthaler Linotype Company and president of the American Institute of Graphic Arts, organized the department and was in charge of its work from 1914 to 1919. His successors have been John T. Hoyle (1920–24), Fred J. Hartman (Acting Head 1924–26), David Gustafson (1927–35), and Glen U. Cleeton (1935–——).

In 1921, the Carnegie Institute of Technology granted the first degree of bachelor of science in printing to young men completing the four-year day curriculum. The following year the laboratory press was established in conjunction with the department of printing. Its master, since 1922, has been Professor Porter Garnett, one of the major influences in the field of American fine printing. In 1932 he received the gold medal of the American Institute of Graphic Arts in recognition of the fine achievements of the Laboratory Press.

The printing industry in the United States and Canada had been keenly interested in the development of the Carnegie school from its inception. In 1927, the United Typothetae of America, the leading trade association in the commercial printing field, established an educational foundation for the support of the Carnegie department of printing. Since that time it has contributed the sum of $125,000 to that department, and its interest in a trade school being maintained in Indianapolis has been transferred to the Pittsburgh Institution. The trade association has also sponsored annual lecture series at Carnegie, and has established a small technical library for the use of student and teachers. Much of the credit for this *liaison* between industry and education should go to Fred J. Hartman, director of the Typothetae department of education from 1926 to 1934 and now in charge of the educational work of the American Institute of Graphic Arts.

Five types of courses in printing are now offered at Carnegie. The great majority of the day students are enrolled in the four-year course leading to the degree of bachelor of science in printing. This course is a combination of general college and engineering subjects with studies in the mechanical, artistic, commercial, industrial, historic, and scientific aspects of printing. The general subjects outside of the field of printing itself are taught by professors and instructors in the various departments of the college of engineering and division of general studies of the famous Pittsburgh technical college, whose president, Dr. Thomas Stockham Baker, is well known in Europe as the promoter of international scientific conferences on bituminous coal. A two-year day course leading to a certificate is given to men with practical experience who wish to concentrate attention on printing itself. Four-year evening courses in hand and machine composition, presswork and layout and design have been offered for years, as well as six-week summer courses in typography, presswork, and layout. The newest curriculum is a two-year course comprising mainly subjects in the fields of printing and industrial management, open to graduates of recognized liberal-arts and technical colleges and leading to the B.S. degree.

During the period 1927–34, from 70 to 100 day students in printing have been enrolled each year, while the evening classes have attracted from 70 to 140 students. The summer enrollment is usually between 20 and 30.

The Carnegie department of printing, with the adjacent Laboratory Press, occupies more than 8,000 square feet of space in the Industries Building. The shops and studio are furnished with equipment valued a few years ago at almost $2,000,000. Major items include ten slug-casting machines, four monotype casters, eight monotype keyboards, eight cylinder presses, two cutters, one folding machine, various other machines, and a wide assortment of matrices, types, original printing plates, and electrotypes.

The number of men and women who have been enrolled in printing courses at the Carnegie Institute of Technology is considerably more than 1,000. Of the day students, a large number have registered from states other than Pennsylvania and from foreign countries. In recent years, about one third of the day students have had relatives in the printing industry; many others have become interested in the college course because of printing courses taken in secondary schools.

Since the first degree in printing were awarded in 1921, 111 young men have received the Carnegie degree of B.S. in printing. The number of day and evening certificates granted since 1914 has been 81.

Nearly all of the graduates have secured employment in establishments in the graphic-arts industries. While most of them are still young men not a few may be safely called "key men" in the organizations with which they are connected. Several hold, or have held, each of the following positions: proprietor, president, vice-president, production manager, sales manager, secretary, superintendent, assistant manager, foreman, layout man, estimator, and salesman. A number of the alumni are at work in advertising organizations or departments, while a few are employed by paper, ink, and other firms in fields allied with printing. Some have become instructors in printing in public and private schools.

The changes which the American printing industry has been undergoing point to the fact that broadly trained young men will have excellent opportunities for service in the industry in the immediate future. The graphic-arts industries have been discovered to be the most complex group among American manufacturing industries, and there is need in this group for a large number of young men who have surveyed the entire field of processes and industrial groups and who can appreciate the existing interrelationship. Through its department of printing, the Carnegie Institute of Technology is annually preparing some of the men who will occupy managerial and executive positions in the American printing industry.

Printing Education in Massachusetts

Printing education owes much to Massachusetts. This state enjoys the double distinction of having cradled the printing industry in British North America, and of having pioneered in the establishment of a state-wide system of trade training.

Stephen Daye brought a press to Cambridge in 1638; and Boston and its environs gained a pre-eminence in the printing and publishing field which they retained for two centuries. Massachusetts still holds fourth place as the home of many of the great book, commercial, and newspaper establishments of the country.

The Douglas Commission of 1905 was delegated by the legislature to examine into the need and feasibility of school training for the industry. Its three-year labors culminated in the rapid rise of trade schools from 1908 on, under combined local and state auspices, until most of the cities of the commonwealth are now able to offer trade training to such of their youth as desire it.

The city of Newton, one of the first to join the system, came in with an already established school, which had been operated for more than a year under semiprivate control. One of the departments of this school was printing, conducted under the instruction of Mr. Morris H. Brown. This became thus, the first trade-school printing department of Massachusetts.

Previous to its establishment, there had been other efforts of training for the graphic-arts industry. Some of them are already difficult to trace. Outstanding among them, and of permanent importance in the history of printing education in this country, was the apprenticeship school conducted by the North End Union, a private philanthropic institution in Boston. Alexander A. Stewart, the man in charge of the printing instruction there was not merely a pioneer, he was a true craftsman, an outstanding teacher, and a zealous missionary in the work he so effectively carried on. From 1900 until the time of his death, he imparted both trade knowledge and enthusiasm to those who were fortunate enough to be his pupils. It is of interest to note that this school appreciated the importance of duplicating industrial conditions as nearly as might be. Its curriculum provided for a "nine-hour day throughout the week, except on Saturdays" — the schedule of working hours which was common in the trade until 1906. Wentworth Institute, an endowed school in Boston, continues the work which Mr. Stewart planned and founded. It cooperates with the Boston Typothetae in training apprentices and in giving extension work for prospective foremen.

The greater part of the printing education existing today, however, is publicly supported. Of the thirty state-aided schools now operating in Massachusetts, fourteen maintain departments of printing. These fourteen schools are located in Boston (2), Worcester (2), Springfield, Newton, Haverhill, Beverly, Holyoke, Medford, Waltham, Weymouth, Everett, and Southbridge. Their total annual enrollment is between 500 and 600 students, whose ages range from 14 up to 25 and beyond. The trade instructors are all skilled men with long experience in the printing industry.

The shop is as close a duplication of industry as possible: productive work on "live" jobs is the rule, and methods and equipment are planned toward that end. All but one of the fourteen departments, for example, have cylinder presses, including in several instances automatics, six of them equipped with composing machines. Trade-school hours in Massachusetts, by state requirement, average seven a day, or 35 a week.

All but two of the above-mentioned trade schools are of the all-day type. Those two are co-operative schools, whose pupils normally spend half time in the industry at a paid employment, and the other half in the school under technical, related, and general instruction. During the subnormal business situation of the past few years, the co-operative schools have to a large extent been driven to provide shop practice within the school walls in lieu of co-operative employment, thus becoming practically all-day schools.

The David Hale Fanning Trade School, in Worcester, maintains the only printing department exclusively for girls in Massachusetts. With small numbers, carefully selected and individually trained, it has been very successful in placing its graduates in proofreading, layout work, composition, and other branches of the trade.

All the trade schools, indeed, accept the placement of their graduates as a direct responsibility and a final test of effectiveness. In a seven-year period, there have been 453 graduates, of whom 61 per cent were regularly employed in the printing trade within three months of graduation. Allowing for others whose placement may have been delayed beyond the time just mentioned, and allowing especially for the widespread unemployment of the past few years, the record is impressive.

The day trade schools, while they are the only ones definitely aiming to send their students into the industry as skilled workers, by no means constitute the entire field of printing education in Massachusetts. In conjunction with many of them, evening extension courses are offered to persons already employed in the craft. Extension work is offered in a few cities which have no day trade-school printing departments, notably in Cambridge and New Bedford, both of which enroll many adult printers in linotype courses.

Printing education in Massachusetts is assured of sympathetic encouragement on the part of the State Department of Education, by the presence on its staff of Mr. Frederick Ames Coates, Assistant Supervisor of Industrial Teacher-Training. Having served an apprenticeship as a printer before and during his college course, Mr. Coates was for several years an active journeyman and a member of the typographical union. He also taught in various kinds of schools, before joining the State Department of Education ten years ago.

(To be continued)

Straight Thinking About Integration

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An article about a subject which is daily acquiring greater importance.

What does integration mean to the teacher of shop subjects? This is no new question to the wide-awake shop teacher, but, nevertheless, it has become a perplexing problem which we must honestly face now, or lay it aside and settle down into the intellectual rut of indifference. The shop subjects are no longer isolated subjects, which exist upon traditional virtues, or behind well-fortified departmental walls. Industrial-arts teachers must come out into the open and face the educational problems with the teachers of every other subject,

which is in reality no mediocre task. If the shop subjects are to hold the place which they have acquired in the educational field, shop teachers must be ready to make necessary adjustments in their subjects, in line with the curricular readjustments now being made in other school subjects. It is sad, but nevertheless too often true, that the shop teacher frequently does not recognize the "handwriting on the wall." This is partly due to the fact that he has been a victim of specialization and departmentalization, and partly to his conviction that he has a program that is built on a solid foundation which can weather the storm of curriculum reconstruction without much effort. Social and economic structures are changing; employment situations for youth have been materially altered, all of which make changes in the school curriculum necessary. From all sides is heard the cry for education for social improvement to replace the education for personal profit. This new emphasis has created a demand for an integrated program in the schools, which will contribute to the development of an integrated individual.

The question arises again and again, how shall we interpret integration? The oft-repeated dictionary definition is familiar to everyone and has little meaning in its present state of interpretation. What we need is a period of straight thinking on the subject of integration. It is true beyond a doubt that specialization, especially in the industrial-arts subjects, has led to departmentalization which has been harmful to the departments. Artificial barriers have been built up which tend to isolate not only the subject but also the shop teacher. Conservative teachers feel that breaking down these artificial barriers is all the change that is needed to bring harmony into the school program. On the other extreme is the movement toward fusion. These represent the two extremes in the curriculum reorganization as viewed from the industrial-arts interests.

Shop teachers must do more than merely co-operate with other teachers in the new program — they must aid in linking together the learning activities in the life of the pupil. On the other extreme the problem is that the shop subjects do not fit into the program of fusion which strips the subjects of their identity. The social-science courses and English appear to be among the first to fall victim to fusion. Other subjects are dragged in, but the shop subjects can find no place in such a program. They must serve the new education in their own characteristic way or they must cease to serve. The problem is to find the middle ground between these two extremes and maintain the fundamental values, and at the same time be among the leading subjects in contributing to social progress and to the integration of the individual.

The fallacy of this entire problem of integration lies in the fact that in an effort to integrate the program the individual has been allowed to fall by the wayside. Too often the program is revised as though it possessed value in and of itself when the final goal is to produce an integrated individual, and certainly not to engage in a race to determine who can concoct the most novel innovation. We, as shop teachers, must keep our feet on a solid foundation, but beware lest we be the last to see the good which is bound to come from the changes confronting us. In facing the new, unexplored, and uncertain adventures it is natural to want to see the results of the change. In trying to observe the results, or what is taking place within the pupil, too often the surface reactions are observed and judged. As one speaker has ably put it — active participation and social responsibility is too often looked upon as a spirit of helpfulness when it should mean sensitiveness to values and concern for the permanent values in life. Sensitiveness and concern for values often do not appear immediately on the surface to be observed. Therefore the program is judged, or misjudged, on the merits of what appears on the surface.

The shop teacher can take heart in the fact that his subject contains an abundance of these desirable deep hidden values as well as of the visible accomplishments. It is his problem in the integration of subject matter to draw these values out and establish them in harmony with the life of the individual. When he has done this he has successfully dealt with the problem of integration. This is not always easily accomplished, and it cannot be done by maintaining an isolated department. This interpretation of integration must, of course, take on a very broad meaning. It means harmony with the entire life of the individual — his school life, home life, social life, economic life, and later his adult life. There must be more than mere co-operation among teachers to successfully accomplish this. It means more than breaking down artificial barriers between departments. It means a close relationship of the school subjects in order to integrate the life of the pupil both in and out of school. The industrial-arts subjects are a part of the general education program. They are not to be miniature industrial plants with the major emphasis on production. The industrial-arts subjects and the school shops are instruments of education and must yield to the needs of education. If the educational program in general is to emphasize the integration of the pupil, then, the industrial-arts classes must enter in one hundred per cent and be one of the first departments to emphasize its potential values. In doing this the skilled and trained teacher must be maintained. There can be no fusion of academic and shop classes. If fusion is to take place it must be the fusion of shop subjects (this is being done at present) but never fusion to the extent that the shop subjects are smothered by academic efforts. This does not mean that the shops should not serve the academic classes. Let Johnny construct an ancient castle and a drawbridge for the social-studies class if he is so inspired. Such integrated endeavor has a very definite place in the modern high school. No doubt he is using the identical tools and materials and mastering the same manipulative skills that he would in making some particular shop project. There are hundreds of similar examples of truly desirable integration — integration within the life of the pupil which the shop teacher can motivate. The entire program in every shop subject cannot serve to this extent, but where there lies a golden opportunity, the shop teacher should be the first to recognize it. It may take reorganization, it may mean more work for the teacher, and it may require better teachers, but when demand arises it must be met by the teacher and his subject, in order to maintain a well-balanced program.

By this time it is evident that integration to the shop teacher must mean more than doing away with the artificial barriers of his department which were so strongly built during the days of specialization. On the other hand, the industrial-arts subjects must not be shoveled into the educational bonfire, to be fused into one lump of subject matter which is of questionable value. Then where is the straight thinking on the subject of integration? The industrial-arts teacher can safely interpret integration as the harmonious correlation of all classes in the school, united in a common effort to serve the individual, and to build up those desirable integrative forces within him. Each subject in the program should reenforce every other subject, the result being a continuous stimulation and motivation of the pupil. The problem is to integrate the thinking and mental activity of the pupil both

in school and out, rather than to be able to point with pride to some innovation which may or may not have disintegrating values. The question naturally arises, How can this be done? Every teacher faces a different problem and must necessarily answer this question in relation to his particular situation. To some it means one thing and to some another, but to all it means careful analysis and open-mindedness. The teacher should face the problem honestly and confidently with an open mind and a desire to make the necessary adjustments. When he has straightened out his thinking on the subject of integration relative to his teaching situation and sees his way clearly, the necessary changes will follow. Integration need not put fear in the teacher's mind. It does not mean the disrupting of the program for the sake of publicity, but rather the adjustment of the program to better serve and develop the individual.

A few important generalizations of the foregoing discussion can be summed up as follows:

1. There is an increasing demand for curriculum revision which is under way, and which is based on fundamental changes in our society. The changes are not "fads and frills," but real needs that must be met.

2. Often shop teachers are slow to recognize and respond to these needs for many reasons among which are:

   a) All subjects to a certain extent, and shop subjects to a large extent, have been victims of specialization and departmentalization. The cause for this lies deep in the evolution of the industrial period.

   b) Hesitating teachers have been put on the defensive and rather than face the facts find a certain amount of satisfaction in believing they have been doing these very things all the while. They seem to think that they have been twenty-five years ahead of the times all the time.

   c) When a change seems desirable, too often the desired results are added to the list of aims and objectives, while the program goes on unchanged.

   d) Many teachers have been prone to look upon the whole idea of a change as giving way to certain "fads and frills" with a belief that the old traditional program can weather the storm of curriculum reconstruction and come out untouched.

3. Industrial-arts teachers are confronted by two extremes — the one tending toward the fusion of subjects and the other fearful of change advocating the *status quo*. The solution lies between these two extremes.

4. The fallacy of the entire problem is that in the efforts to present an integrated program with all the theoretical virtues the important problem of integrating the individual has been allowed to fall by the wayside.

5. The industrial-arts teacher can safely interpret integration as the harmonious correlation of all classes in the school, united in a common effort to build up the integrative forces within the individual.

This shifts the emphasis from values of the organization of the program to the results produced by it which, in the last analysis, must be judged from the growth and development of the pupil.

Aviation in the High School

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Aviation is gradually becoming one of the accepted means of transportation and is rapidly developing into an important industry. That aviation has proved itself useful and at times almost indispensable is indisputable at the present time. Moreover we will find that flying through space will be an important means of transportation in the not-too-distant future.

Aviation experts are of the opinion that the time will soon arrive when the piloting of airplanes will not be limited to just a few highly trained pilots. When engineers develop a type of ship that will be comparatively safe and easily flown by the average individual there will be a greater demand for trained personnel in this field.

The schools have in the past attempted to provide opportunities for their students to prepare themselves to enter various industries. In fact many of our present shop courses are the result of new industries coming into existence. The school, therefore, is the place where aviation enthusiasts look for an education in this field. Although at present only a few institutions of learning are endeavoring to teach aviation to their students, it is only a question of time when most of the schools will include some phase of this subject in their curriculum.

The problem at present is to determine to what extent schools can undertake the teaching of aviation. The nature of the work will have to depend in most cases on the facilities that are available. Some schools, because of the lack of adequate space, will have to limit their courses to an academic treatment of aviation. In these courses students may obtain an appreciation as well as a general knowledge of airplanes by concentrating on such topics as the history of aviation, types of airplanes, the theory of flight, the names and functions of the various parts of an airplane, the materials used in the construction of an airplane, and possibly, some elementary meteorology.

One of the reasons why many schools are not attempting, as yet, to do much work in aeronautics, is because of the lack of teachers who are trained in this field. If a fairly complete course in aeronautics is to be provided it is advisable that the work be taught by a competent instructor. In addition to having some conception of flying it is advisable that he be a licensed mechanic. Of course, it is not necessarily essential that the instructor be a licensed mechanic for teaching some of the elementary courses.

The increased importance of aviation as a means of transportation makes the need of aeronautical courses in high schools practically a necessity.

For example, a short course involving the construction of ribs and wing sections may be given in regular woodworking classes. The principles of airplane motors can very easily be taken up in the auto-mechanics courses. The principles of flight, the study of stresses and other technical phases of aviation

A, Working on a Kinner-5; B, doping; C, spraying fuselage; D, checking lappets; E, welding the fuselage; F, learning to swing a propeller

may be included as a unit in the physics classes.

Schools that have sufficient room may very easily equip a shop for practical work at a very nominal cost. At present properly accredited schools may secure all the airplane equipment they require from the United States Army Air Corps, or from the United State Navy Bureau of Aeronautics. These departments have available from time to time complete airplanes, motors, and other airplane accessories which they will ship to schools at a very small cost — the only expense is the transportation and handling charges.

The most satisfactory procedure to follow in developing an aviation program is to begin with a class in model-airplane construction. If it is impossible to conduct this class during a regular school period a model-airplane club can be organized to carry out this work outside of school hours.

Various local, state, and national organizations are constantly conducting model-airplane contests to interest the young people in aviation, and boys and in some cases girls, will very enthusiastically grasp the opportunity to participate.

The model-airplane class is suggested as the first shop class with which to begin developing an aviation program for the following reasons:

1. There is no problem of equipment with which to be concerned since no additional equipment is required beyond that which is ordinarily found in any manual-training shop.

2. No special room is required. The average woodworking shop is very adaptable for this work. It is true that the room may not be very satisfactory for testing the models, but this can be easily remedied by taking the students to the gymnasium when they are ready to fly their models.

3. The cost of maintaining this course is very small. The supplies needed are few and may be purchased at a very small cost.

The aviation program in the Hamtramck High School was developed after a study was made of the work being done in the different airplane industries and flying schools throughout various sections of the United States.

It is not the purpose of the school to train its students to be skilled mechanics in any particular line. It is the aim, however, to give those choosing aeronautics a general knowledge of this field and to acquaint them with operations similar to those they will be called upon to perform if they should enter some branch of aeronautics in the near future. At present the aeronautical curriculum in the high school consists of the following courses:

Aero I — Model Airplanes
Aero II — Aerodynamics
Aero III — Airplane Construction
Aero IV — Advance Airplane Construction and Welding
Aero V — Airplane Motors
Aero VI — Airplane Drawing

In most instances students interested in aeronautics are first required to enroll in the model-airplane course. In this course the students are given the fundamental principles of airplanes. The students become acquainted with various types of airplanes, the name and function of their parts, and a general knowledge in the reading of blueprints. At the same time the students construct different types of scale and flying models. This course is particularly important to the beginner, inasmuch as it gives him a good working knowledge of airplanes as a foundation for the remainder of his courses. Moreover the students, while building models, develop an attitude and habit of accurate workmanship which is essential to do satisfactory work on an airplane.

The aim of the course in aerodynamics is to furnish the students with sufficient technical material in order that they may better understand the methods of repairing and maintaining an airplane in good flying condition. The work in this course consists chiefly of readings and discussions on such topics as the history of aviation, materials used in airplane construction, stresses imposed on an airplane, how an airplane is designed, principles of lift, drag, parasitic resistance, streamlining, characteristics of various types of airplane, and propellers.

The airplane-construction courses deal entirely with operations in repairing and servicing an airplane which a government-licensed airplane mechanic would be called upon to do. In order that the work be of a practical nature the shop is equipped with two complete airplanes.

An outline of the two courses in airplane construction is given here to illustrate the type of work which any school may eventually develop.

AERO III

Unit I — The Structure of the Airplane

Lesson 1 — The construction of the wing
Lesson 2 — The construction of the fuselage
Lesson 3 — The construction of the control surfaces
Lesson 4 — Types of control systems
Lesson 5 — Types of landing gears
Lesson 6 — Types of shock absorbers

Unit II — Woodwork in Airplanes

Lesson 1 — Types of wood used in airplane construction
Lesson 2 — Steaming and bending wood
Lesson 3 — Gluing
Lesson 4 — Laying out ribs
Lesson 5 — Construction of a rib

Unit III — Metalwork in Airplanes

Lesson 1 — Types of airplane metals
Lesson 2 — Types of airplane wires
Lesson 3 — Wrapping wire terminal

Lesson 4 — Ferrule terminals
Lesson 5 — Splicing aircraft cable
Lesson 6 — Safety wiring turnbuckles

Unit IV — Covering the Airplane

Lesson 1 — Fabric
Lesson 2 — Dopes and finishes
Lesson 3 — Patching airplane surfaces
Lesson 4 — Covering a wing, control surfaces, tail surfaces, fuselage
Lesson 5 — Marking airplanes

AERO IV

Unit I — Repairing the Airplane

Lesson 1 — Classes of repairs
Lesson 2 — Splicing and repairing spars
Lesson 3 — Repairing ribs
Lesson 4 — Repairing trailing edges
Lesson 5 — Repairing leading edges
Lesson 6 — Splicing tubing
Lesson 7 — Straightening bent control surfaces

Unit II — Rigging

Lesson 1 — Assembling the airplane
Lesson 2 — Disassembly of the airplane
Lesson 3 — Trammeling a wing
Lesson 4 — Squaring a fuselage
Lesson 5 — Checking the angle of incidence, stagger and dihedral angle
Lesson 6 — Adjustment of control wires

Unit III — Correction for Unstable Conditions

Lesson 1 — Correction for nose heaviness
Lesson 2 — Correction for tail heaviness
Lesson 3 — Correction for wing heaviness
Lesson 4 — Correction for directional unstability
Lesson 5 — Correction for propeller torque

Unit IV — Line Inspection

Lesson 1 — Daily inspection
Lesson 2 — Periodic inspection

Unit V — Propellers

Lesson 1 — Installing a propeller
Lesson 2 — Removing a propeller
Lesson 3 — Tracking a propeller

Unit VI — Welding

Lesson 1 — Welding joints used in airplane construction
Lesson 2 — Splicing longerons
Lesson 3 — Laying out, cutting, and welding rudders, elevators, and fins

The course in airplane motors deals first with a general discussion of the gasoline engine. This is followed by practical work on airplane motors, such as, checking tappet clearance, valve grinding, timing, tearing down and assembling various types of motors. The shop is equipped with a Kinner-5 and a Continental A-40 motor which are mounted on motor stands and are used for testing. In addition there are other motors for practice in motor repair.

The course in airplane drawing has just been developed. At present this work is being given in the regular advance-drawing classes. Students taking aeronautical courses, after completing two semesters of elementary drafting are permitted to work on drawings dealing entirely with airplane problems. In the first part of the drawing course, the students work on problems involving airplane fixtures, wings, spars, fuselages, and various other structural members. The second part of the course deals with drawings of airplane motor parts and assemblies, developments for metal cowlings and propellers.

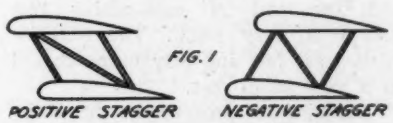
In order that the students will obtain the proper procedure for carrying out these jobs and secure sufficient technical material, which is vital for doing the work properly, the students work with lesson sheets. The lesson sheets contain an explanation of the job and also illustrate the correct method of doing the work. The following is a sample lesson sheet which is used by the students.

TYPICAL LESSON

AERONAUTICS III

Unit II — Rigging; Lesson 5 — Adjusting Stagger

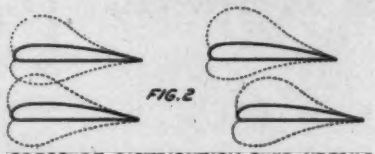
Stagger refers to the setting of the leading edge of the upper wing ahead of or behind the leading edge of the lower wing. When the leading edge of the upper wing is set ahead, the stagger is known as positive. The setting of the upper leading edge to the rear of the lower wing is known as negative stagger (see Fig. 1).



Stagger is used to some extent to improve the vision of an airplane. However, its principal purpose is to increase the efficiency of the airplane. The study of aerodynamics will show that the lift of an airplane is caused by the decrease of pressure above the wings resulting in an increase of pressure below the wings due to the method of air travel over the airfoil. If the two wings are evenly placed above the other without too great a gap between them, it is found that there is an interference of the high pressure area of the upper wings with the pressure area of the lower wings. This interference will destroy the lifting qualities of the wings, especially the lower one. Increasing the distance between the wings and moving the upper wings ahead or to the rear of the lower wings will result in eliminating this interference (see Fig. 2).

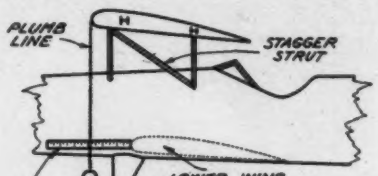
The stagger, on biplane wings, is adjusted in the following manner:

Plumb lines are dropped from the leading edge of each end of the center wing section so that they will just clear the fuselage. The location of the leading edge of the lower wing is marked off and the horizontal distance from the plumb line to this mark is measured. The stagger struts



or wires are then adjusted until this distance is of the required length (see Fig. 3).

Since aviation is to become an important as well as an essential industry, it



is only fitting and proper that schools as progressive institutions of learning recognize this fact and help in every way possible to promote aviation to the fullest extent. After all it must be remembered that it is the young people of today that will be called upon to carry on in the future the development of this important field.

PROGRESS

As we surpass our father's skill,
Our sons will shame our own;
A thousand things are hidden still,
And not a hundred known.

And had some Prophet spoken true
Of all we shall achieve,
The wonders were so widely new,
That no man would believe.

Meanwhile, my brothers, work and wield
The forces of today,
And plough the Present like a field,
And garner all you may!

You, what the cultured surface grows,
Dispense with careful hands:
Deep under deep forever goes,
Heaven over heaven expands.

— *Tennyson*

REAL EDUCATION

When the work of the school enters into the whole life of the child as an accepted and worthy end of living, then real learning flourishes; and it is then that the new teacher and the new administrator begin to find those first signs of the unguessed powers of the human spirit. — *Hughes Mearns.*

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

The Sane Fourth

We oldsters are likely to revive pleasant memories when we think back to the Fourth of July celebrations of our youth. The lapse of time has effaced from our memories the smart of the burns which we acquired on faces, hands, arms, and legs, while celebrating the Glorious Fourth in the good old way. We may even feel sorry for the youngsters who are now being deprived of the privilege of using fireworks with which to burn and maim or even kill themselves.

It is fortunate that the Sane Fourth movement is gathering greater momentum year by year, and yet the yearly roster of accidents directly traceable to the use of fireworks is appalling. The data of this year's list has not as yet been completed. Were they compiled, they would, no doubt, be as harassing as last year's tabulation. All of this, in spite of every effort to publicize this worth-while movement.

A glance at the 1935 statistics gathered by the American Museum of Safety in co-operation with the National Society for the Prevention of Blindness shows that there were 6,940 fireworks accidents serious enough to receive newspaper mention. Among them there were 24 deaths, 539 eye injuries, and 57 cases of loss of sight. Each state in the Union had its quota of injury cases — largely children who had been allowed to celebrate Independence Day in the "good old way."

It is too late to do anything about the celebration of the 1936 Fourth of July, but it is well for shop teachers to mark their calendars even now for next year's ante-vacation safety talks. If the Fourth of July celebrations should really become safe and sane, every teacher must do his part.

The newspapers of July 5 and 6 this year show that the accident list for this year, if anything, will top last year's record. As an indication of some of the happenings, it is necessary only to refer to the news flash which gave a lurid picture of the trail of destruction caused in one case by a firecracker, and in another case by a sparkler that had been carelessly dropped. The firecracker started a blaze which leveled several business blocks and left one hundred families homeless at Remsen, Iowa, while the sparkler caused a fire which all but wiped out the village of Oyens, Iowa, destroying the homes of about two hundred persons.

Besides these two fires, there are many deaths already reported directly traceable to the unsafe practice of permitting children to play with fireworks, and there are accounts of a great many injuries, which, while not fatal, may cripple children and adults for life. Many of these Fourth of July accidents are the cause of eye injuries, and when one eye is injured, sooner or later the other may become affected also.

The shop teacher, therefore, should be especially interested in spreading the gospel of the Sane Fourth. Artisans who are crippled, or who have defective vision are doubly handicapped. They have trouble in securing work, and then when they have secured a job, they have difficulties because of their poor eyesight or some other physical defect.

A united effort toward the abolition of all fireworks except as to pyrotechnic displays carefully supervised and handled by experienced technicians, is, therefore, to be aimed at, and only concerted effort will produce a diminution of the yearly sacrifice to the senseless celebration of an event which ought to be coupled only with joy and happiness.

What Vocational Education Has Done For The Unemployed

That the schools of this country have done their share in the solution of the unemployment problem is quite evident from information received from the Office of Education, Washington, D. C.

According to their report more than 3,000 unemployed persons were retrained for new types of work and placed in employment in Georgia. A little more than half of these were instructed in canning, and their work resulted in the preservation of 93,866 quarts of fruits and vegetables, and 52,237 cans of meat. Others were taught how to garden, and 1,400 were trained in harvesting and storing foods for man and animals.

In California many unemployed were trained to retrain others. About three fourths of the youth 16 to 20 years of age enrolled in evening extension classes in Oakland were unemployed. At the Frank Wiggins Trade School in Los Angeles, 1,457 out of 2,370 persons enrolled in evening classes were unemployed or employed irregularly only.

Florida gave vocational training and secured employment for 2,500 persons. In Miami 839 persons were given training for hotel service. Most of them obtained employment.

Alabama served 34,500 unemployed through its vocational classes during the past school year. Birmingham, besides enrolling its own unemployed in evening and all-day schools, also opened its schools to members of transient camps and gave them training.

Arizona, Nevada, and other western states inaugurated placer mining classes which were conducted by itinerant teachers traveling about in fully equipped laboratory trucks.

Arkansas has used practically all of the money available for vocational education under the George-Ellzey bill, for the relief of unemployment.

The superintendents of schools from 17 cities from different sections of our country report that their evening and day vocational classes, during the year, had served upward of 2,100 unemployed persons. Many received adjustment training for new jobs and were subsequently employed.

Taxpayers and industrialists may at present still feel that this training and retraining of workers is unimportant, but there are some of the more thoughtful employers who are already predicting the dire consequences which will follow the curtailing of vocational education in some of the larger cities during the past five years.

The teachers of industrial arts and vocational education must be commended for manfully standing by during these trying times, and in many cases keeping up the work of training and retraining the unemployed at great personal sacrifice, in order to keep up the morale of the unfortunate while preparing them for a better and brighter future.

A Useful Publicity Program

D. W. Castle

Vocational Director,
Township High School and Junior College,
Joliet, Illinois

A description of the fine piece of publicity work carried on by the Illinois Vocational Association for the past five years.

"Back in 1932 I so nearly lost my job that I started to pack up before school was out. A local taxpayers' organization demanded the elimination of all 'fads and frills' in the school and I was teaching one of them — woodworking." I heard an industrial-arts teacher tell that story the other day. I asked him for a definition of a "fad or frill" and he cleverly defined it as "something that wasn't taught when *you* went to school." In other words a fad or a frill is a subject that has been a late arrival in the family of school subjects. There is nothing traditional about fads and frills. The mine run of taxpayers do not know how they got into the curriculum or what value they have. They reason, then, that these subjects should be dumped overboard to keep the ship from sinking, carrying down with it the good old standby subjects that they studied. Someone ought to ask the question: "Why have we not acquainted the school patrons, school boards, and school administrators with the educational purposes and values in these subjects?" Then when something has to go, they can intelligently examine the educational needs of their children and the requirements of the community and thus make an intelligent decision. The answer is that those of us in the vocational- and practical-arts field have been so busy "sawing wood" (literally), that we have neglected to take our light from under the bushel to let it shine on the educational values of the instruction we are giving. It is time this is being done; at least the Illinois Industrial Education Association thought so in 1932, and so they set to work at the task. What I tell here is an account of our lessons learned and our results.

We decided early that more than one medium of disseminating information should be used, and that we would enlist the aid of nonschool people. Accordingly the co-operation of the Parent-Teacher Association was sought and obtained. It was discovered that on the list of speakers that were sent out to all of the P. T. A. units only two of several hundred were representatives of our field. This situation was remedied at once by enlisting the aid of industrial-arts men throughout the state. They agreed to prepare talks on our form of education and to be prepared to speak before P. T. A. groups in their respective districts. As soon as the new list was sent out these speakers found themselves in great demand. It was the first time these organizations had ever had anybody tell them about industrial arts and vocational education. These same speakers were made available to service clubs and other organizations. They reported many accepted invitations to speak to these organizations — something that had never happened before.

The radio, of course, was utilized. Under a plan prepared by Mr. J. A. Brandt, of Mooseheart, several series of programs were given over stations throughout the state. The plan was this: Leading citizens in the community surrounding the station were approached and asked to aid the cause. Expecting them to plead ignorance relative to the educational philosophy of our field, we prepared beforehand several abridged talks that we could put in their hands. It was astonishing to note how the same philosophy came back to us through the air from voices that could command a much better hearing than any schoolman could expect. We learned early that statements concerning schools are worth much more if made by a patron or a leading citizen than if made by an educator.

With the permission of the radio speakers, we printed several radio talks in the form of little pamphlets that would easily slip into an ordinary envelope. We also collected other material complimentary to our field from various sources and, with the permission of the authors, printed them in the same form. These pamphlets, thirteen in number, were sent out all over the state to legislators, school administrators, school boards, newspapers, and others of influence. We also sent large supplies of this literature to vocational directors and others to distribute in their community and to drop into envelopes carrying their correspondence. Two pamphlets can be included in the ordinary letter without increasing the postage. Many thousand copies of this literature were scattered around in this way without cost. These pamphlets also were made available at conventions and any other meetings where we could get them placed at the registration desk. In all about 75,000 copies have been distributed in this manner at very little cost. The pamphlets themselves were printed in school shops, usually for the cost of the paper. At the present time we have the following pamphlets:

1. "Uneconomical Economies" by Mrs. J. P. Starr, former chairman District No. 1, Illinois Parent Teachers Association, Aurora, Illinois.
2. "Practical Arts Work and its Relation to the Delinquent and Dependent Child" by Judge George D. Long, Rock Island, Illinois.
3. "Schools Exist for Children" by Angelo Patri, New York City, New York.
4. "Vocational Education from the Standpoint of a Manufacturer" by Everett D. Kaser, President Durabilt Steel Locker Co., Aurora, Illinois.
5. "The Relationship of the School to the Delinquent and Dependent Children" by Judge Onley Allen, Geneva, Illinois.
6. "Excerpts from the I. V. A. Scrapbook."
7. "Educational Institutions More Important to the Nation than Penal Institutions" by Dr. Charles H. Judd, chairman Dept. of Education, University of Chicago, Chicago, Illinois.
8. "The Necessity for Vocational Education from the Viewpoint of a Prominent Physician" by Dr. Elliot S. Denny, Aurora, Illinois.
9. "Advocated in 1909 — Defended in 1933."
10. "Maintain and Improve Secondary Education" by C. M. Burgess, President, Burgess-Norton Mfg. Co., Geneva, Ill.
11. "Education and its Relation to the Workers in Industry and Business" by Wilson P. Hunt, Vice-President, Moline Tool Co., Moline, Illinois.
12. "What Labor Says Regarding Vocational Education and Equality of Opportunity in Education" by Dr. C. A. Prosser, Director Dunwoody Institute, Minneapolis, Minn.

13. "Safeguarding Education" by Mrs. Theo. Gliechman, former Director District No. 4, Illinois Parent Teachers Association, Moline, Illinois.

14. "Manual Training Law of Illinois."

15. "Those Fads and Frills."

Perhaps this story leaves the impression that the task is finished. Far from it. This literature is being reprinted and distributed. New pamphlets are being added.

The result of an educational program is hard to determine. It is practically impossible to isolate all other influences that might cause a change. The best indication of worth-while results comes from a study by Mr. F. C. Wood, assistant high-school visitor, and Mr. A. W. Clevenger, high-school visitor for the University of Illinois. They obtained information relative to the additions and the eliminations from the list of practical-arts offerings in 379 Illinois high schools that are accredited to the North Central Association of Colleges and Secondary Schools. This is what they report:

Number of schools eliminating industrials-arts subjects since 1929	22
Number of schools adding industrial arts or reinstating them since 1929	51

In other words, so far during the depression the number of industrial-arts programs has actually increased in Illinois.

From this we may safely conclude that if we continually keep the school patrons thoroughly informed concerning our form of training, there will never come a time when its place in the secondary-school curriculum will be questioned. To supply this information is our duty.

Example of the Type of Addresses Used

VOCATIONAL EDUCATION FROM THE STANDPOINT OF A MANUFACTURER

Everett D. Kaser, Aurora, Illinois

I am happy to have the privilege of addressing you for a few minutes this afternoon on a subject that I am sure is of great interest to nearly all parents and school children throughout the nation. I have chosen to speak on the subject, "Vocational Education from the Standpoint of a Manufacturer."

I am deeply concerned, as I am sure you all are, over our badly disjointed economic situation. I know it is difficult to maintain one's composure and balance in the face of such political, social, and economic unrest. I know that there is a trend, which amounts almost to hysteria, to reduce taxation and governmental expenditures, and I am heartily in accord with this movement up to the point where we begin to "kill the goose that lays the golden egg." I believe that every political subdivision and every taxing body in the United States should reduce its budget and, if possible, its tax rate, and our public schools should not be exempted from this program. As a matter of fact, we know that our public schools have borne their full share of this tax-reduction program. I take my hat off to school boards, school executives, and school teachers of our country who have worked together to absorb these reductions in income with the minimum of impairment in the service which our schools render to their respective communities.

But, we have now reached a phase in this desire for tax reduction where we must pause and give sober thought to probable results, if we were to follow the advice of certain uninformed people. These people would have us eliminate the so-called "frills" of our educational system. When they speak of "frills" they usually refer to vocational subjects as taught in our high schools. It is to retain these subjects in the curricula of our high schools that I am appealing to you this afternoon. I am sure when you are fully informed in this matter you will take your stand with the other level-headed citizens of your various communities to see that justice is done to the boys and girls now, and soon to be, in your high schools.

As a manufacturer, in the neighboring city of Aurora, it has been my pleasure to employ several graduates of Mooseheart, as well as those trained in vocational subjects by the high schools of Aurora. Without exception, we have found these young men and women to be conscientious and sincere workers who have had a training that enables them quickly to adapt themselves to the routine of shop and office. They quickly step into the class of experienced employees.

The criticism of vocational education most frequently heard is that "it doesn't really make printers, bookkeepers, machinists, stenographers, woodworkers, and other artisans of its students." Of course, it doesn't. Nor does a college make a doctor, nor an engineer, of its students. It takes years of internship in a hospital before the graduate of a medical school "may hang out his shingle." Very few graduates of our engineering schools earn their salt the first few years. Almost without exception, it requires years of experience before our college graduates become of great value to their employers and to society. Surely, then, we must, if we are fair, grant that the graduate of our vocational schools should have at least a few months for experience and adaptation before we condemn his training.

I want to call your attention to the fact that the cost of public education is fundamentally a per-capita cost, not a subject cost. By this I mean that it is the total number of students you have in a school which determines the total cost — not the subjects taught. In other words, the students who are now enrolled in vocational courses will still be in our public schools, even though we should eliminate these courses. It will be necessary to enlarge our facilities for college-preparatory courses in order to accommodate them, should we decide to eliminate our vocational courses in a wholesale manner. Our savings in cost will be but little, if any, and the loss to students in training will be tremendous. Should we eliminate the commercial subjects, industrial arts, home economics, or similar subjects, we will have to establish new academic classes, and employ other teachers to take care of them.

We can no more return to the low cost, simplified form of education in vogue many years ago than we can discontinue the advances of civilization. In the year 1870, 18.2 per cent of the children of school age were employed in industrial or commercial organizations. By 1930, this percentage had dropped to the exceedingly low figure of 4.87 per cent, and today this percentage is very much smaller. This clearly indicates that industry and business no longer have a place for children. Neither have they a place for the worker who a few years ago would be classed as having a strong back and a weak mind. The point I want to impress upon you is this — the continued increase in the number of students in our secondary classes is in direct proportion to the decreasing number of youths in industry. This is indeed as it should be, for it indicates the advancing civilization. It means that through education, the luxuries of yesterday will become the necessities of tomorrow. It means the creation of a market for the things which our factories manufacture and our merchants sell.

In the year 1890, practically every student in our high schools expected to enter college and to prepare for a profession. Today, our educators conservatively estimate that over 80 per cent of all our boys and girls now in high school will seek employment as soon as they graduate.

Today, all too many of our schools are saying to this great mass of high-school students that they must take those subjects that are required of the 20 per cent who are going to college. Our high-school pupils in the 80-per-cent group realize that their scholastic work is ended when they leave high school, and they are demanding that their needs be given consideration. They know that society will soon demand that they contribute to its general welfare, and they realize that they must secure in the schools that fundamental training which will make this possible. The solution is to be found to the highest degree in those studies which we call vocational studies. Fundamentally, vocational education provides the technical knowledge and develops the basic skill which is required to assure success in any employment in which the future citizen may earn a livelihood. It is not limited to the mechanical trades. It prepares for the wage earner's job and the salaried position. No company can make a better investment than to provide the education and training which will assure the future citizen a means whereby he may earn a living.

So, my friends, as we come to the time when we must consider reduced budgets and lower taxation, let us think twice before we eliminate, or greatly curtail our efforts, for vocational education. Rather let us think and work along the line of making vocational education more effective. Let us study those systems of vocational education in our country which are well developed and highly effective. Let us plan for closer co-operation between our vocational schools and industry. In short, let us give to that 80 per cent of our high-school students throughout the country, who cannot continue their studies in colleges and universities, the best possible training which will prepare them for life.

The Silent Teacher

Delmar Olson
Washington School,
Rapid City, South Dakota

William L. Hunter
Iowa State College, Ames, Iowa

The bulletin board may be made a valuable teaching aid and it is well to know how to make attractive posters for it.

For several years the writers have been collecting and using the following saws and maxims which pertain very largely to the work of the industrial-arts teacher. They have used these maxims in various ways. One of the most effectual uses to which these can be put is to have each maxim in the form of a fairly large colored poster which is legible to those who pass through the hall or laboratory. One of these posters can be placed on the bulletin board or in a display case each day. In this way pupils become accustomed to looking at the board each time they pass, and the "silent teacher" or maxim does its work. In this connection, it also is well to remember that "Signs unchanged are signs unread."

The project of preparing posters from these maxims is sometimes welcomed by the teacher of art or drawing. Or, again, a teacher of printing may care to have some interested pupil work on one or more of these as problems in printing.

By observing a few simple suggestions any resourceful teacher can soon learn to make his own posters. The making of the finest posters is an art, but it is also true that the maker of the finest posters was once a very green amateur. A few brief suggestions for the amateur follow. First of all, remember that simplicity, as in all forms of design, is the keynote. With this idea in mind:

1. Take a small sketch of the desired poster, laying out the lettering and placing the illustration. (See Figures 1 to 5.)
2. Lay out the plan, including the border with charcoal, chalk, or soft pencil in full size on a scrap sheet of paper, and make any needed changes.
3. Lay out the accepted plan on the poster stock, bristol board, or heavy paper, sketching the lettering full size and accurately between guide lines.
4. Do the lettering, outlining the characters with pen and india ink, and then filling them in.
5. Draw or paste on the illustration.
6. Add the border design.

There are several kinds of reservoir lettering pens on the market which are adapted to poster work. The pen-lettered posters are easiest for the amateur. If color is desired, regular poster water colors thinned considerably are recommended. The following is a list of pleasing color combinations. It is well to limit the number of colors to three, including that of the poster stock.

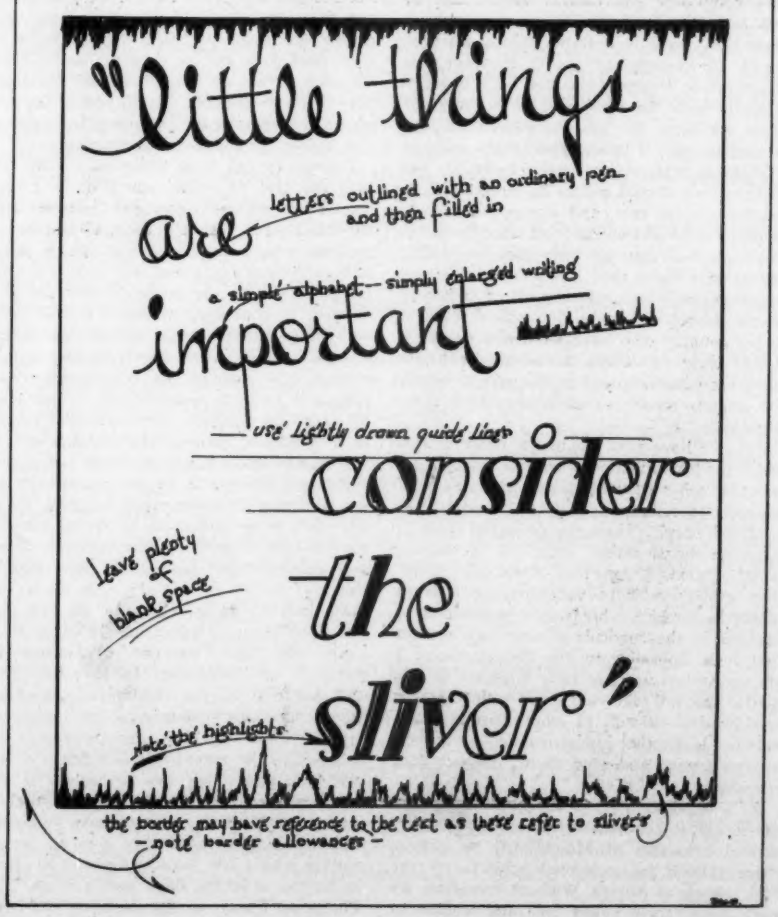
Red, white, yellow-green
Blue, buff, brown
Maroon, yellow, yellow-green
Purple, yellow, gray-green
Blue, turquoise, yellow-orange
Brown, red-orange, yellow
Dark red, yellow, red-orange
Dark blue, red-orange, yellow-green

Black or white, or both can be added to any combination without fear.

Practically any form of illustration will lend interest to the "silent teacher." The beginner may clip pictures from magazines or from story books and paste them on. Even lettering may be clipped from periodicals and pasted in place. A file or scrapbook of these illustrations is very desirable. As soon as the poster maker becomes more confident of his ability, he will want to make his own illustrations with water or poster colors. A study of Figures 1 to 5 will be worth while to the amateur.

If neither of the foregoing plans for securing or producing posters can be followed, each of the maxims may be typed off neatly on a sheet of paper

FIG. 1


"little things
letters outlined with an ordinary pen and then filled in
are
a simple alphabet — simply enlarged writing
important
use lightly drawn guide lines
consider
leave plenty of blank space
the
sliver"
note the highlight
the border may have reference to the text as here refer to sliver's
— note border allowances —

with an appropriate border. (See Figure 6.)

Following is a list of saws, proverbs, and maxims which will appeal especially to the poster maker in making his "silent teachers" for the industrial-arts laboratory:

Character is to man what carbon is to steel.

He that hath many irons in the fire — some of them will burn.

A place for everything and everything in its place.

Fine carvings are not made of rotten wood.

Better wear out than rust out.

In machines the small gears are as important as the large ones.

There is no demand for an auto without a self-starter.

Keep thy shop and thy shop will keep thee. — *Franklin*

Little things are important — consider the sliver.

Decayed trees do not withstand great storms.

Alloy steel is stronger than iron — cooperation is superior to individualism.

Let not thine hands be slack.

A good workman is never overpaid.

No man is his craft's master the first day.

Skill and assurance are an invincible couple.

Leisure is a time for doing something useful. — *Franklin*

The hands of the diligent shall bear rule.

Every artist was first an amateur. — *Emerson*

Every sort of wood is not suited to making arrows.

A tough nut may be turned if a drop of oil is used.

Measure twice — saw once.

The hammer is no good if it loses its head.

Without tools man is nothing — with tools he is all.

The tallest trees grow straight.

Be a live wire and you won't get stepped on.

All the world's a camera — look pleasant, please.

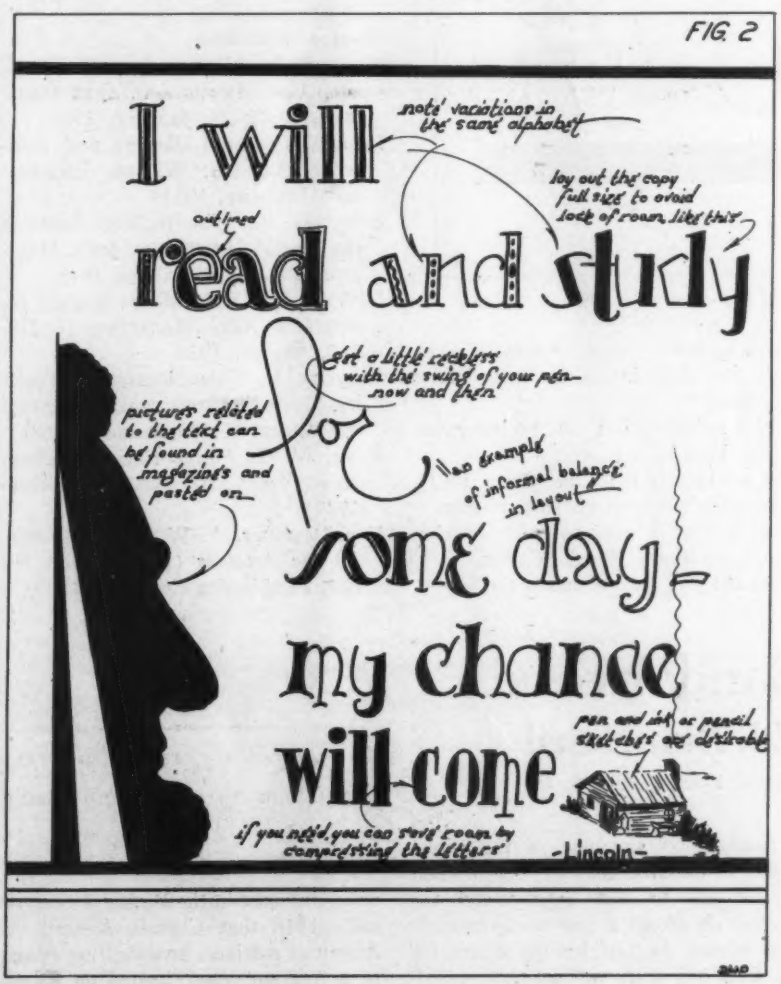


FIG 2
I will
note variations in the same alphabet
lay out the copy full size to avoid lack of room like this
outlined
read and study
get a little reckless with the swing of your pen now and then
for
pictures related to the text can be found in magazines and pasted on
an example of informal balance in layout
some day
my chance
will come
pen and ink or pencil sketches are desirable
if you need you can save room by compressing the letters
-Lincoln-

Handle your tools without mittens.

The good ad contains what the writer wants to say and what the reader wants to read.

The hobby craftsman does more than build things — he builds himself.

A chain is no stronger than its weakest link.

I know what pleasure is, for I have done good work. — *Stevenson*

Good steel withstands much hammering.

The home workshop is a college of leisure time.

Above your shoulders you are worth ten times as much as you are below.

Do small things in a big way.

A cutting tool is no better than its edge.

No time is lost in grinding.

Rough stones will often take a high polish.

It hurts to get hurt. Be careful!

One picture is worth a thousand words.

What sculpture is to the block of marble, education is to the human soul.

A good anvil does not fear the hammer.

Architecture is frozen music.

A man may be an artist though he have not his tools about him.

By hammer and hand all arts do stand.

Many men continually attempt to make auger holes with a gimlet. — *Franklin*

Do not be ashamed of your craft.

If a diamond be thrown into the mire, it is a diamond still.

It's ill jesting with edge tools.

When you are the anvil, bear; when you are the hammer, strike.

The used key is always bright.

A good head and an industrious hand are worth gold in any land.

Hit the nail on the head.

It takes many licks to drive a nail in the dark.

Practice makes the master.

By avoiding work one only fools himself.

One cannot make all shoes over the same last.

Steel whets steel.

A tinker's budget is full of necessary tools.

He that works without tools is twice tired.

The wheel that turns gathers no rust.

By the work we know the workman.

Horseshoes are not made with gossip.

Shoemaker, stick to your last.

Have a temper but don't lose it.

Knowledge plus work is irresistible.

Small value in a rusty tool or a rusty brain.

The smith's mare and the cobbler's wife are always the worst shod.

See also Fig. 4 on page 245, and Fig. 5 on page 246

Diligent work makes a skillful workman.
The history of man cannot be studied apart from his tools.
When the whistle blows some folks drop the hammer in the middle of a swing.
Keep the water dropping on the stone.
Common sense is the universal joint of the human mind.
Nothing sharpens your temper so quickly as a dull ax.
One may gain two seconds at a crossing and spend two months in a hospital.
An automobile is no more dangerous than the driver.
When you whittle, whittle from you.
It costs less to plan more.
To err is human, but to make the same mistake twice is foolish.
The keen boy likes keen tools.
Always saw on the right side of the line.
Be not wasteful; even knotholes have their uses.
Most diamonds have 56 faces, human beings have need of but one.
When in doubt consult Webster.
Says one Sequoia to another, "Keep growing."
Only a novice boasts that he has never been hurt by a jointer.
The world has little use for a Ph.D. who can't roll up his shirt sleeves.
This is God's workshop for making men. — *Henry Ward Beecher*
What the boy makes, makes the boy.
The artist was forgotten but the work lived.
The boss won't be a crank if you are a self-starter.
Every printer's devil has hunted type lice.
Few novices know how to use a long-handled wrench.
Somewhere in life man should experience joy in doing things.
No man, big or little, ever turned down the gift of a good pocketknife.
Caution is the parent of safety.
A handsaw was not made to shave with.
A high building, a deep foundation.
An idle brain is the devil's workshop.
As is the workman, so is the work.
Craft against craft makes no living.
Every potter praises his own pot, and the more if it be broken.
Good ware makes quick markets.
Success consists in getting the best, not of others, but out of one's self.
Houses have been built with a hammer and ax, but the best houses are built with a full kit of tools.
You can't make a piece of walnut out of gumwood.

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Sandalwood

Ed. Blanchard

Queens Village, New York

An interesting related-information lesson on a valuable species of wood.

Sandalwood was one of the rarest products which Columbus sought when he set sail to find Cathay and the Indies. He found a new world instead, and neither he nor his successors for the next 235 years realized that sandalwood did exist in the Pacific. It was not until 1778 that Captain Kendall, an American mariner, investigating rumors of a fragrant wood, landed on Kannai

TILT-TOP TABLE

Intermediate Woodwork.
PROJECT SHEET A-194.

SCALE 3/16"=1"

INTO THE GREAT UNKNOWN WE GO, EXPLORERS ALL.

THE COLUMN - BLACK WALNUT AND MAHOGANY ARE THE BEST WOODS TO USE FOR THE TILT-TOP TABLE. YOU COULD USE WHITE OR GUM WOOD. IN THE ROUGH, THE COLUMN IS 3¼" X 3¼" X 25". TAKE THE TWO SAW CUTS AT EACH END OF THE PIECE, AS SHOWN AT -A- THESE SAW CUTS AID IN CENTERING THE STOCK. TEST WORK TO SEE THAT IT IS FASTENED SECURELY. SHARPEN THE LATHE TOOLS. ROUGH THE STOCK DOWN TO A DIAMETER OF 3⅛. WITH A PENCIL

-A-

Designed by Clifford

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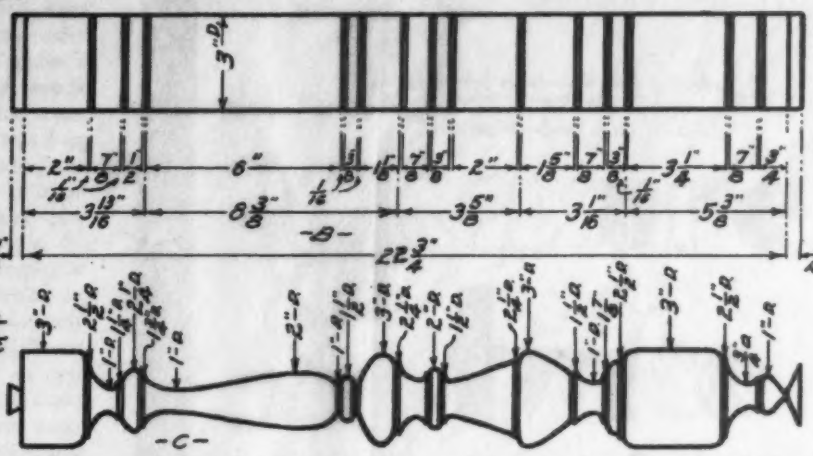
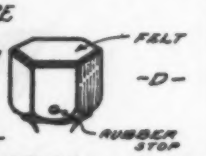
AND RULE LAY OFF THE MEASUREMENTS AS SHOWN AT -B-. TURN CENTER PART OF COLUMN FIRST TO AVOID VIBRATION. TURN ALL PARTS 1/16 LARGER THAN DIAMETERS SHOWN. THIS ALLOWS FOR SANDING. —

NOTE SKETCH -D- IT SHOWS THE TOP OF THE COLUMN SHAPED TO THE FORM OF A HEXAGON. THIS HEXAGON IS OBTAINED BY LAYING OFF THE RADIUS ON THE CIRCUMFERENCE. THEN TAKE A PENCIL AND A BLOCK OF WOOD, AS SHOWN AT -F-. LAY OFF THE ARISES IN THE MANNER SHOWN. PLANE TO THE LINES. —

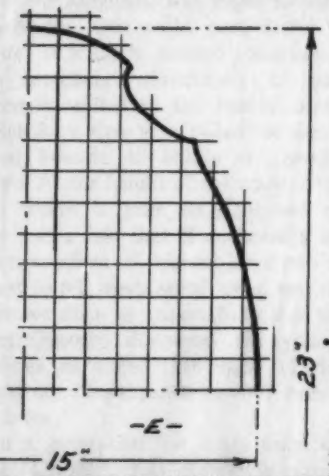


WE ARE NOW READY TO LAY OUT THE MORTISES. A PATTERN MAY BE MADE OUT OF HEAVY PAPER, AS SHOWN AT -G-. APPLY TO COLUMN AND THEN TRACE. SET 1/2" CHISEL IN MORTISING MACHINE AND BORE 1 1/8" DEEP. W-120. CARE SHOULD BE TAKEN THAT EACH MORTISE LINES UP WITH THE CENTERS OF THE FACES OF THE HEXAGONAL TOP. —

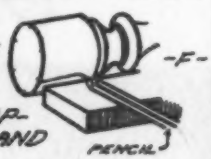
THE LEGS— MAKE A PATTERN FOR THE LEGS. THEY ARE MADE FROM 1 1/8" STOCK. PLACE THE PATTERN ON THIS STOCK SO THE GRAIN RUNS AS SHOWN BY THE ARROW LINE IN SKETCH -H-. BAND SAW JUST OUTSIDE THE OUTLINE. FINISH TO THE LINE WITH A SPOKESHAVE, CHISEL AND FILE. TEST THESE EDGES FOR SQUARENESS WITH THE FACE SIDE. — W-20.



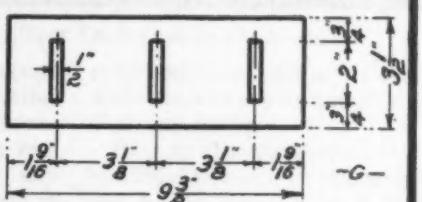
SAW THE TENONS ON THE CIRCULAR SAW. BE SURE THAT THEY MAKE A TIGHT FIT WITH THE MORTISES. — W-120.



THE TOP— GLUE UP THE STOCK FOR THE TOP, USING 7/8" MATERIAL. ALTERNATE THE HEART AND SAP-WOOD SIDES OF THE BOARDS AND MATCH THE GRAIN WITH CARE. A DOWEL JOINT MAY BE USED. — W-112.

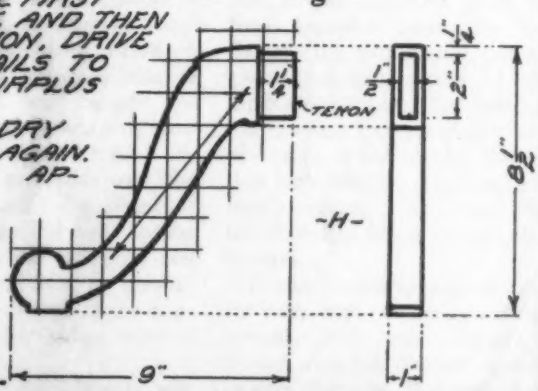


FACE THE BETTER OF THE TWO SIDES AND THEN GAUGE AND PLANE TO 3/4" IN THICKNESS. THE LAYOUT FOR THE OUTLINE IS SHOWN AT -E-. AFTER APPLYING IT TO THE WOOD, BAND SAW AND FINISH CAREFULLY TO THE LINE. SHAPE THE EDGE TO THE DESIRED FORM IN THE SHAPER. —



ASSEMBLY— SAND EVERY PART THOROLY WITH FINE SANDPAPER. TEST EACH TENON AND IF THEY FIT PROPERLY APPLY HOT GLUE FIRST TO THE MORTISE AND THEN TO THE TENON. AFTER INSERTING TENON, DRIVE IN THREE OR FOUR 1 1/2" -#16 FINISHING NAILS TO HOLD JOINT TIGHT. WASH OFF ALL SURPLUS GLUE THOROLY. —

SPONGE WITH WATER AND WHEN DRY SAND WITH #00 PAPER UNTIL SMOOTH AGAIN. USE A WATER STAIN. ALLOW TO DRY. APPLY A THIN COAT OF ORANGE SHELLAC. SAND WHEN DRY. FILL HOLES AND CRACKS. FOLLOW WITH TWO COATS OF WHITE SHELLAC. SAND, PUMICE AND ROTTENSTONE. —



Designed by Clifford B. Smith, East Amherst, New York

of the Hawaiian group and there found an abundance of wild sandalwood. After destruction of the trees through undisciplined exploitations, Hawaii again is raising this most precious of all woods.

Sandalwood has been used and treasured since about 500 B.C. It was long believed to be confined to India, and India is still the chief source. It is indispensable in certain Buddhist religious ceremonies and especially in funeral rites, but it has been employed in the manufacture of small secular articles such as boxes and fans, not only in the east but in Europe. Sandalwood oil is an important ingredient of perfume and medicines, and even the shavings and sawdust are saved and made into a fragrant paste which the Chinese use to scent their joss sticks and the Brahmins use to make their ceremonial caste marks. It also is employed in wool dyeing. In France, in the reigns of the latter Louis, the wood was made into medallions and strung to make necklaces.

The great Kamehameha I, the ruler who consolidated the Hawaiian Islands into one kingdom, was eager to obtain goods for the world and foster the trade. It scarcely needed fostering, for the merchant adventurers of many countries sailed to the Pacific islands, which for a time were called the Sandalwood Islands, to obtain the precious cargo. At the height of the trade, $400,000 worth a year was shipped out. There is a tale that Kamehameha sent large numbers of his subjects into the forest to fell sandalwood trees, and that he drove them so unmercifully that they surreptitiously destroyed the younger saplings in order that their children might not be subjected to such punishing labor.

In a generation the sandalwood was gone, Liholiho, Kamehameha's successor, saw the last of it go, but the islands had to be scoured before he would be satisfied. He desired to purchase a small vessel, the Cleopatra, and the owner demanded payment in sandalwood. A curious trade was made. A hole was dug in the ground of the same cubic dimensions as the hull of the ship. It was agreed that this hole should be filled with sandalwood as payment. The owner parted in another of his ships and sold the wood for $80,000.

What little was left was hunted as though it were gold. Taxes were paid in sandalwood and, for a while, it was practically used for money. It was in 1829 that a rumor was astir to the effect that another Pacific island, far to the southward, produced the fragrant wood. Boki, governor of Oahu, outfitted an expedition of two ships, the Kamehameha and the Becket, manned with 500 men, and set sail. The first ship landing was made at Rotuma, north of Fiji, but when the Kamehameha sailed from there she was never heard of again. The Becket, however, reached Eromanga where it was thought the wood would be found. It was not, however, and trouble broke out among the adventurers and the natives and the few traders there, and an epidemic of some tropical disease followed. It was decided to abandon the enterprise and when the Becket got back to Hawaii, there were but 20 survivors of the original 500, and even they had no news of sandalwood.

Soon afterward, sandalwood was found in western Australia and that has been a source of supply of limited quantities ever since the Hawaiian lesson had been learned, and the trees are conserved, as they are in Mysore, India, where there is a government monopoly of the harvesting.

It seems that the hunters of Hawaii had failed to note a few hidden saplings and, in the course of years, scattered trees appeared again. By this time, though, the natives had probably forgotten the old glories of the brief sandalwood trade. They were, perhaps, too interested in pineapples and other rare crops of the islands. But, recently, they have received attention, principally from scientists at first, and then from the Hawaiian board of agriculture and forestry.

It was decided to supplement the few survivors with new stock and the board brought seed from Mysore, India. Today, on a hill 750 feet above the sea looking down on Honolulu, there is a grove of 1,500 sandalwood trees three years old. They are thriving. The success of this experiment has resulted in the assignment of the young men of the

FIG. 4
A novel alphabet constructed entirely with ruling pen and compass
note the variations in the fill-in
Measure
twice
mechanically designed yet it's catchy and lots of fun!
Saw
once
filled in with a brush

See article on "The Silent Teacher" pages 242 to 244

Civilian Conservation Corps in the islands to the planting of the sandalwoods. They are using the seed of the few surviving native trees and now the trees from India are beginning to bear seed. Thousands of sandalwood trees are being planted.

The reason that the destruction was so complete is that the wood is too valuable to be harvested like other timber. Everything is taken, including the roots, from which oil and tars can be richly distilled. So the trees had been removed in the literal sense of the phrase, root and branches. There were no roots left for new stock to spring from.

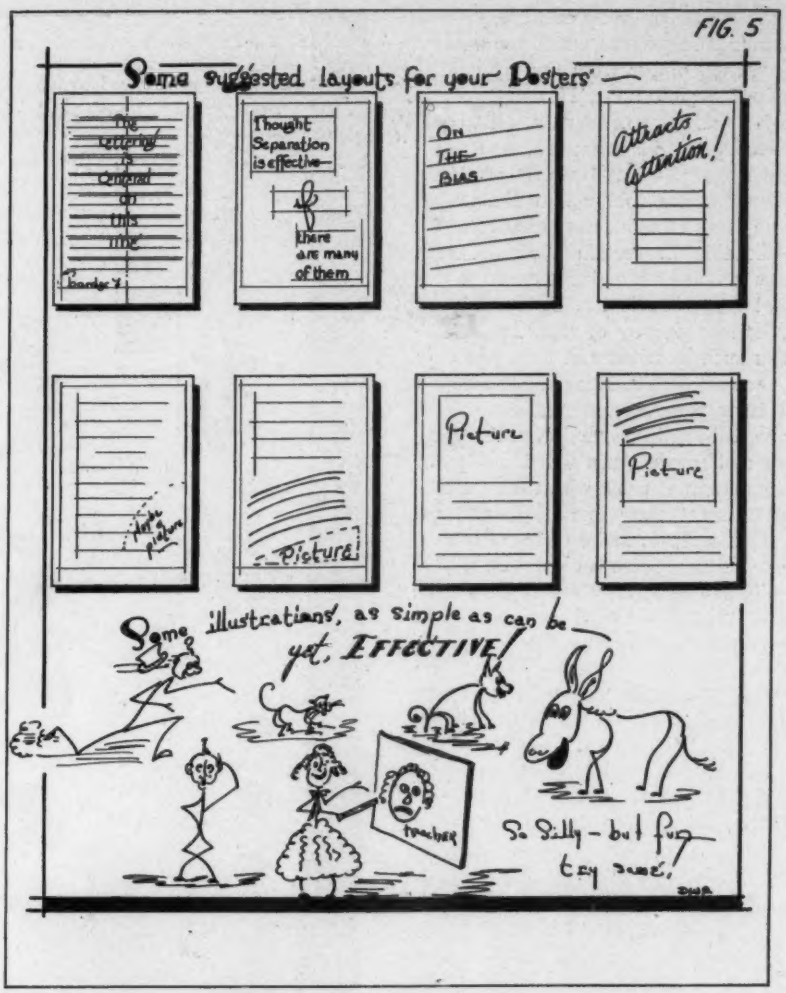
A peculiarity of the sandalwood tree, and probably the reason for the richness of its properties, is that it not only lives on the soil, but is an underground parasite. Indeed, unless a sandalwood tree can fasten its roots to some other tree it will not live and flourish. It draws a supplemental sustenance from its neighbors.

The technique being followed now in Hawaii is to plant sandalwood seed beside saplings of the ironwood tree, which has been ascertained to be a desirable host. When the time comes for the sandalwood shoot to be transplanted from the nursery, its companion, the ironwood tree, is taken along with it. While the sandalwood becomes of commercial value when it is of small size, if left to grow it will become as large as the cottonwood and of a similar shape and appearance. The Forest Service at Washington has aided with advice and that agency and experts of the Yale School of Forestry, are certain that Hawaii can be reforested.

A tree of 25 years' age is valuable, but from 40 to 50 years are required to achieve the necessary growth to produce timber. The chief use of sandalwood timber which, obviously, is of great value, is in the making of coffins for Chinese mandarins. Only the very wealthy can afford them. A sandalwood twig or a bit of a root has a money value, so it can be surmised what planks for a coffin are worth. The finest known is the peacock-eye sandalwood. This, like American bird's-eye maple, is spotted by buds which burst before they thrust through the bark and become branches.

Sandalwood, it will be seen, is not a crop which can be planted like potatoes, yielding a quick result. The next generation will reap the profits from the new forests of Hawaiian sandalwood. By that time, presumably, the Territory of Hawaii will have become the forty-ninth state of the United States and the others can enviously watch her luxuriate in sandal-scented leisure.

FIG. 5



See article on "The Silent Teacher" pages 242 to 244

Educational Charts

Frank C. Cech

Trade School,
Cleveland, Ohio

A teaching device which may be helpful in certain places.

Much has been written in recent years about visual aids to shop instruction. While the efficiency of such aids is at times questioned and remains a controversial subject, it may at least be said that their proper use is an important and distinct help to the instructor. They are crutches which should be discarded when their use has been outlived. That we learn to do by doing is an indisputable fact. That modern craftsmanship demands a much more widespread technical knowledge and greater manipulative skills than the same craft did twenty-five years ago also is true. Thus, cooling systems on motor blocks, airplane and Diesel-engine parts, turbines, manifolds, and the like, involve intricate designs that require a greater

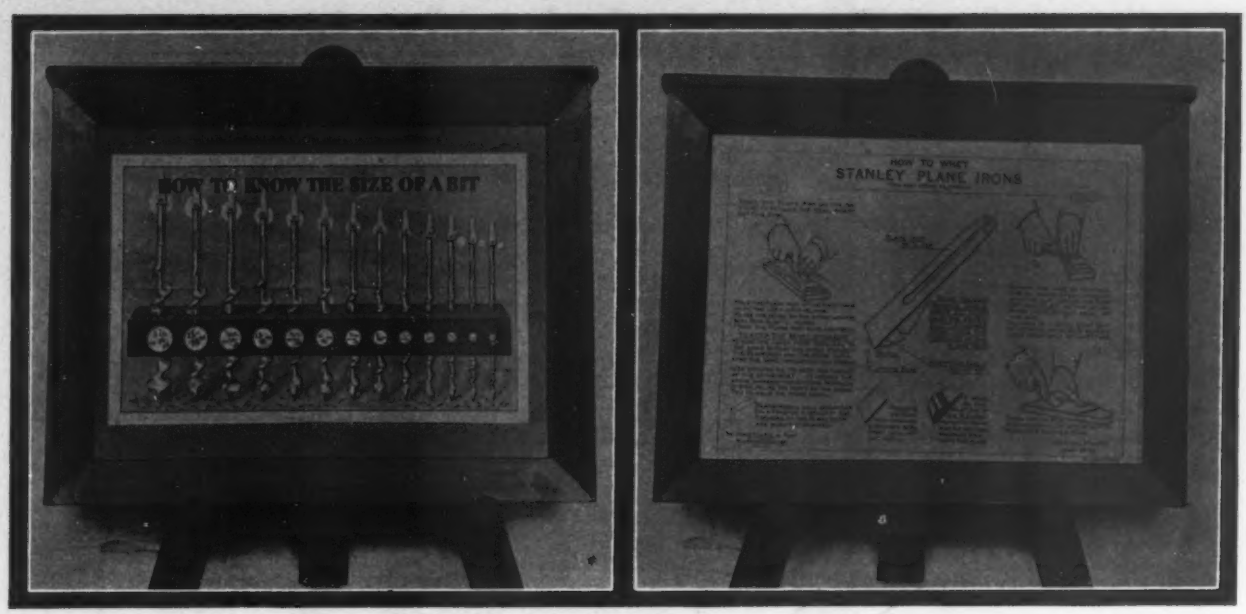


Fig. 3. Frame for display charts in use

degree of accuracy, manipulative skill, and power of visualization than ever before. Then, too, there is a constantly changing line of tools, equipment, materials, and supplies about which a tradesman needs to keep informed. The same may be said of the machine trades, permanent molding, die casting, foundry, and other industries.

Numerous teaching devices must, therefore, be resorted to in order to cover the continually broadening field. Many manufacturing companies have made available to the instructor charts, texts, and illustrative materials, but the method of how to use and store them may become a problem at times.

The easel and frame, illustrated and described herewith, show one method of handling these charts, for which the following advantages may be claimed:

1. It may be used concurrently with demonstrations to emphasize or supplement technique.

2. When not so used, it forms a permanent consulting exhibit as the cards are changed periodically, thus providing a ready reference and review.

3. It has proved itself to be of interest to pupils, commanding and holding their attention.

4. It can be made to accommodate any number of mounted charts.

5. It requires but little room and is easily transported.

6. It provides dustproof storage, thus saving the charts from the effects of ordinary handling and use.

7. Additional references may be made in blueprint form and mounted.

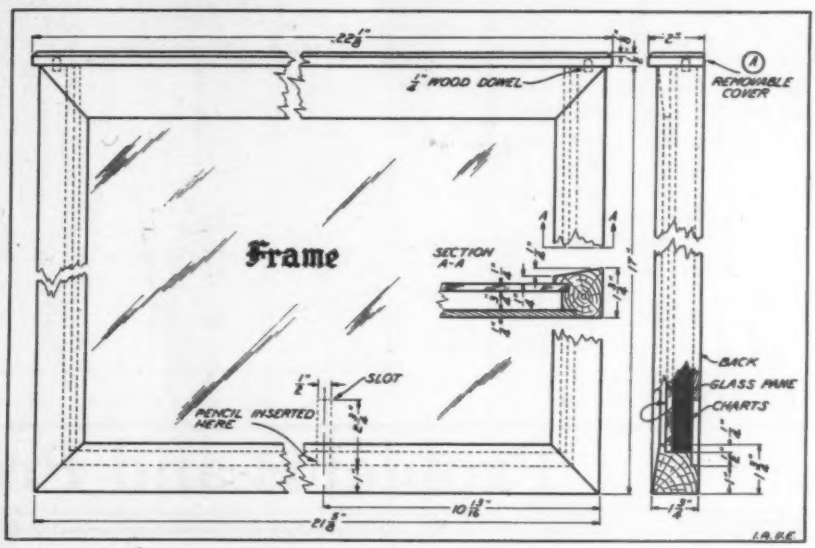


Fig. 1. For Fig. 2 see page 248

The device consists of two parts. The first is the frame for storing and exhibiting the cards (see Fig. 1). Its construction is similar to that of a picture frame. It differs: First, in having the rabbeted section made deep enough to accommodate any predetermined number of display charts;

Second, in having the top section of frame made open as shown in Section AA, which continues on up through the top crossrail of the frame;

Third, in having a removable cover A, which permits inserting, withdrawing, and changing the display cards;

Fourth, in having a solid wood back, in which is cut a small slot, as indicated in Figure 1. Into the bottom of this slot is pushed the rubber end of a pencil, or a small dowel pin, to assist in pushing up the display charts when the necessity arises for withdrawing or changing them.

The second part of the teaching device is the small easel, on which the frame rests during demonstrations. It is shown in Figure 2 in sufficient detail to be self-explanatory.

Figure 3 shows how the unit appears when set up before the class, or for display purposes.

Points for Personal Analysis

L. M. Roehl
Cornell University, Ithaca, N. Y.

1. Am I generally liked by my fellows?
2. Does my personality wear well?
3. Have I a sound viewpoint toward rural shopwork?
4. Have I good managerial ability?
5. Am I neat and methodical in my work?
6. Have I mental and physical vigor?
7. Do I assume responsibility?
8. Have I a desirable stimulating attitude?
9. Do I have foresight?
10. Do I have interest in and participate in community problems?
11. Am I reliable?
12. Have I an uplifting influence with boys?
13. Can my personal conduct be criticized?
14. Have I pronounced technical ability?
15. Do I admit that I don't know it all?
16. Am I a growing individual?
17. Am I alert for new ways to improve my teaching?
18. Have I the correct objectives for the shop course?
19. Does my shop course fit into the needs of the community?
20. Do I take the correct attitude toward public problems?
21. Do I co-operate well with my fellow workers?
22. Have I good judgment?
23. Have I a good sense of humor?
24. Do I have high personal and professional standards?
25. Do I like boys and people generally?
26. Do I command the respect of the boys in shop classes by what I say and do, and how I say and do it?
27. Am I self-reliant and tactful?
28. Am I a good disciplinarian?
29. Have I the ability to plan ahead?

Honest self-analysis assists in the professional growth of the shop teacher.

30. Do I follow instructions?
31. Do I keep my shop in good order?
32. Have I a good sense of time and material values?

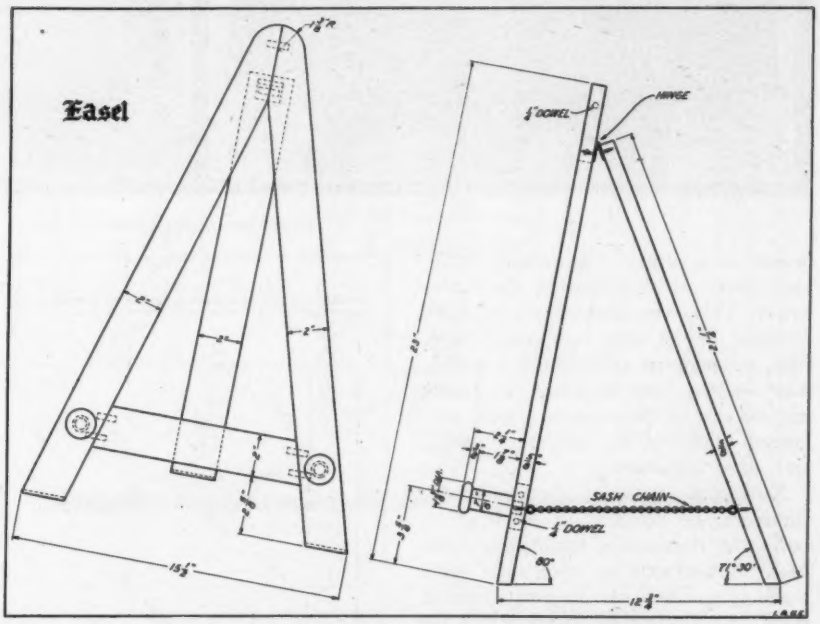


Fig. 2. See article on "Educational Charts" pages 246 and 247

Problems and Projects

ATWOOD'S CHAMPIONSHIP MONOPLANE

Terence Vincent, Director Walker's Glider Club, 501 So. Broadway, Los Angeles, California

The model monoplane illustrated and described herewith is the one with which William E. Atwood of Oak Park, Calif., won the national duration title at Akron, Ohio, in 1934.

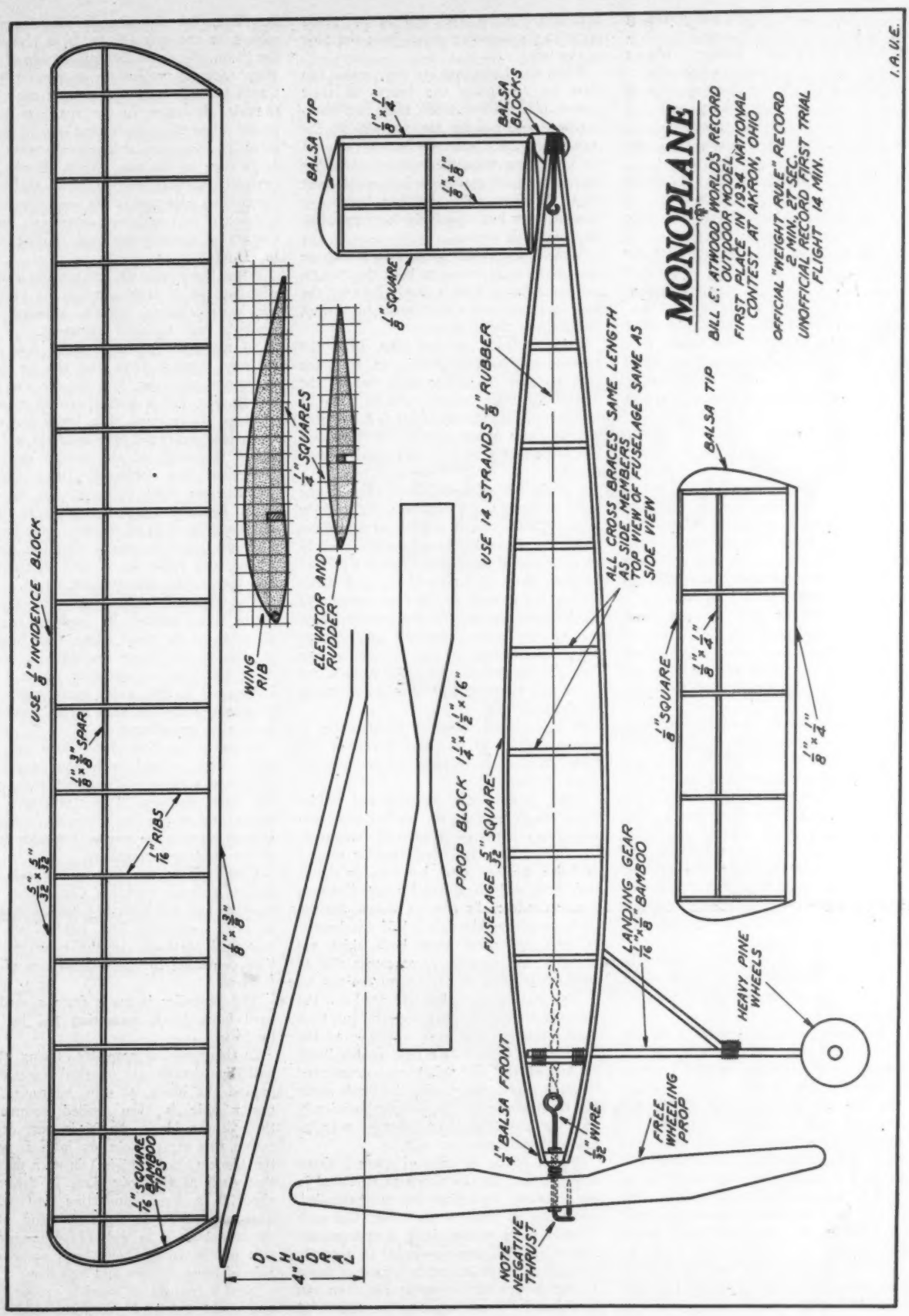
It was so hot on the day of the contest that rubber motors functioned very badly, so that a flight of 2 minutes and 27 seconds won the national duration championship. The monoplane shown, under favorable conditions, has made cruises of 14 minutes' duration.

The following shows the bill of materials required to build one of these monoplanes.

Atwood monoplane

Bill of Materials

8 pc.	5/32 x 5/32 x	36	Balsa; Fuselage, longerons, fuselage braces	2 pc.	1/16 x 3 x	36	Balsa; Ribs and tips for tail and wing
2 pc.	1/8 x	1/8 x 36	Balsa; Tail edges and braces	2 pc.	1/8 x	3/8 x 36	Balsa; Wing spar


MONOPLANE
BILL E. ATWOOD WORLD'S RECORD OUTDOOR MODEL
FIRST PLACE IN 1934 NATIONAL CONTEST AT AKRON, OHIO
OFFICIAL "WEIGHT RULE" RECORD 2 MIN. 27 SEC.
UNOFFICIAL RECORD FIRST TRIAL FLIGHT 14 MIN.
I.A.V.E.
USE 1/8" INCIDENCE BLOCK
1/8" x 3/8" SPAR
1/16" RIBS
5/32" x 5/32"
1/8" x 3/8"
1/16" SQUARE BAMBOO TIPS
WING RIB
ELEVATOR AND RUDDER
1/4" SQUARES
1/8" SQUARE
BALSA TIP
1/8" x 1/4"
1/8" x 1/8"
BALSA BLOCKS
USE 14 STRANDS 1/8" RUBBER
ALL CROSS BRACES SAME LENGTH AS SIDE MEMBERS
TOP VIEW OF FUSELAGE SAME AS SIDE VIEW
PROP BLOCK 1/4" x 1 1/2" x 16"
FUSELAGE 5/32" SQUARE
LANDING GEAR 1/16" x 1/8" BAMBOO
HEAVY PINE WHEELS
1/4" BALSA FRONT
1/32" WIRE
FREE WHEELING PROP
NOTE NEGATIVE THRUST
DIHEDRAL 4"

		and trailing edge
1 pc.	5/32 x 5/32 x 36	Balsa; Wing leading edge
3 pc.	1/16 x 1/16	Bamboo; Tips of wing and tail (optional)
3 pc.	1/16 x ⅛ x 12	Bamboo; Landing gear
1 pc.	1¼ x 1½ x 16	Balsa; Propeller block
1 pc.	¾ x 1¼ x 1¼	Balsa; Nose block
1 pc.	⅛ x ¼ x 18	Balsa; Elevator and rudder trailing edges

1 pc. 1/32 x 12 Steel music wire; Shaft, hook, wheel axles, free-wheeling spike
4 1/16 Metal washers; Thrust bearings
2 shts. 20 x 24 Airplane tissue; Covering of body, wings, tail
1 oz. Nitrocellulose cement (airplane cement)
2 oz. Banana oil n.c.p.
2 pc. 1⅞ Wheel, Celluloid or
2 pc. 2 Wheels, Balsa
Silk thread

Lay out the full size of every part, and build the monoplane on these outlines.

Begin either by making the wing, or the fuselage; or make part of one and then part of the other, arranging a continuous flow of work with least loss of time.

The rear-end hook of music wire has a loop sufficiently large to hold the 14 strands of rubber, and also a smaller loop on the other end which is cemented and tied within the end braces and longerons of the fuselage.

The propeller shaft, as well as the end-hook, may be covered with a ¾-in. piece of rubber tubing or radio spaghetti, to keep the rubber strands from being cut.

The propeller shaft hole, through the nose block, has a slight down thrust. This is said to help avoid stalling and nose-diving. Some put a tiny metal tube through this hole, to make a better bearing; and others cement metal washers on each side of any balsa part through which a steel wire is to operate, such as axle bearings and propeller-shaft bearing.

A ⅜-in. square balsa cube is cemented on the top of the rear end of the fuselage. This gives the elevator a slight negative incidence.

The rudder may be cemented to the elevator, and this tail assembly either cemented to the fuselage or tied in place with ⅛-in. rubber strand.

The Atwood Monoplane may be made according to the following directions:

Fuselage. Lay out full-size silhouette outline of body, and pin the longerons in pairs to this shape. Moisten the 5/32 by 5/32 by 36-in. sticks on one side so that they will bend in making the curves more easily. When dry, they will then retain the curves.

Cut the body braces out of 5/32-in. square balsa. Four will be required of each of the following lengths: 1¾, 2½, 2⅝, 2¾, 2⅝, 2⅜, 2, 1½, and ⅞ in. These occur in the sequence given from the nose to the tail.

When the longerons are dry, make two sides by cementing the braces in their proper places; and when these are thoroughly dried, moisten the top side of the upper longerons and the bottom side of the lower longerons, then cement the other braces in place, making a four-sided body with all sides alike. Rubber bands, or threads, may hold the body in place while the cement is drying.

Make the rear-end hook with a loop on each of its ends — one to hold the rubber, and the other to hold it firmly between the four longeron-ends with cement and thread. Cement and tie in place.

Using a flame, or hot pipe, bend the bamboo landing gear about 2 in. from the end, so that the lower ends (where the wheels will be attached) will be 8 to 12 in. apart. When the bends are O.K., cement and tie these upper ends to the front side braces perfectly in line, and let dry thoroughly.

Put the propeller-shaft hole through the nose block so there will be a slight *down thrust*. This is said to help avoid nose dives and stalls. Cement a bead or washer firmly on each side of this hole to insure a perfect bearing. Shape this nose block, with 5/32-in. notches in each of the four corners, so the longeron tips may be cemented in place, leaving the nose completed and exactly 1 in. square. One or two strands of silk thread, cemented in place, may encircle the block and longeron tips to hold everything in place.

A balsa block, about a ⅝-in. cube, is cemented on top of the tail end of the body, to give the elevator correct position when in flight.

Tail. Lay out the elevator and rudder plans actual size, pin the leading and trailing (rear) edges in place, and cement in the braces and tips. Tips may be shaped of balsa, 1/16-in. reed, bamboo, or aluminum wire, with about equal flying efficiency. Experts may make ribs, as shown, for the elevator and rudder instead of flat braces. If ribs are used, then both sides are papered; but paper only on upper side of elevator is used, if flat braces are put in.

The rudder may be cemented to the elevator, before papering, and the unit thus made, held to the rear top side of the fuselage by cement or a tight rubber band. If desired, this tail unit may be cemented in place permanently, with the block under the trailing edge of the elevator sufficiently high to insure a 1- to 2-degree negative angle of incidence.

Wing. Make 14 ribs of correct shape and size, and cut the niches as indicated in the drawing. Two ways are recommended, one being as good as the other: Cut each 1/16-in. balsa rectangularly to approximate size of the rib, then sandpaper to accurate airfoil; or shape an entire chunk of balsa to the proper airfoil curvatures, then run it through the saw making the ribs 1/16 in. thick. Set the ribs in place, evenly spaced, on the spar (⅛ by ⅜ in.) so that the ⅛-in. edge is on the bottom side of the wing, with no projections of ribs or spar. Check for accuracy of setting of each rib, so that all angles to the spar are right angles. Then place the trailing edge in place, after it has been streamlined, with the knife edge to the rear. When all ribs are perfectly vertical, and at right angles to the trailing edge and to the spar, then drop a touch of nitrocellulose cement on every contact of spar to rib, and trailing edge to rib.

When thoroughly dry, attach the leading edge into all 14 front slots of the 14 ribs, with nitrocellulose cement, allowing the whole to dry in perfect alignment.

To make the dihedral, make saw cuts halfway through from the top on both edges and the spar, just outside the two middle ribs. Put a drop of cement in each of these six cuttings, then break the spar and edges gently till each wing tip is 4 in. above the level of the center section's underside, this underside being pinned or otherwise held perfectly flat on the table. Let the wing dry perfectly, then apply a drop or so of cement to the undersides of these six cracks near the wing's center, and again let it dry thoroughly. Now cover with tissue paper.

The wing and tail assembly are papered in the usual manner, by applying banana oil n.c.p. to the wood edges, then holding or pinning the tissue smoothly in place. After the paper is smoothly on, and the banana oil is dry, water spray gently, or steam the tissue and let it shrink into more acceptable smoothness.

Ordinary model-airplane dope may be used, when mixed with four parts of thinner or acetone, and sprayed thinly over the paper surfaces. This strengthens the paper, and makes the surfaces smoother. It adds little to the weight, but adds much to the airplane's toughness.

Check up to see that the wheels and landing gear are workable. Check wing and fuselage and tail assembly, to see that all is made correctly. The rudder may be cemented vertically to the elevator, and then cemented to the tail-end top of the fuselage.

The propeller is made from a medium hard balsa block measuring 1¼ by 1½ by 16 in.

In this mode of propeller carving, three knife-line bands are marked completely around the block, at 4-in. intervals. The center hole is then drilled completely through the block. An X is next drawn across this center hole, on both faces of the block (1½ by 16 in.) in such manner that each of the four lines so drawn is about 9 in. long, connecting the parallel lines which are 4 in. from each end. Mark the hub about ⅜ in. wide (3/16 in. on each side of the center hole), and carve outside of these X lines and hub lines.

Next a triangle of wood is carved from *one* of the 1½ by 16-in. sides, which later

will be the leading edge. Each of these right triangles measures about 5 in., and the other triangle legs are exactly ⅝ in. and 4 in. Look at the illustration for a side view of the propeller, and carve accordingly.

Completed, this propeller may weigh about 1/10 of the complete weight, or nearly 1/5 of one ounce.

Finish the propeller by the usual balancing, sanding, and banana oiling, one lad applied nine coats of banana oil, permitting each application to dry with gentle sanding after each, and a final rubbing of silk cloth.

Free-wheeling is the term applied to the freely revolving propeller after the power is all gone. The arrangement is simple: Put the propeller shaft through the propeller (after three or four small washers have been placed between propeller and nose block), and bend a right-angled L about ⅜ in. long. About ¼ in. away from the center hole, insert a piece of steel wire, ¾ in. long, parallel to the propeller shaft into the hub, leaving about ⅛ in. of it sticking up, as shown.

The motor consists of 14 strands of para rubber ⅛ in. wide, loosely attached to the rear hook and the propeller shaft. It will require about 34 feet to make the 14 strands.

Spaghetti, or rubber tubing, may be used on these wire loops, so the rubber strands will not cut so easily.

Flying the airplane is fairly simple, when you know how, but quite perplexing if you don't. So these few hints are offered:

A. Mount the tail and wing to the fuselage, with ⅛-in. flat rubber, tied tightly but not so the fabric or wood will be nicked.

B. Glide gently forward, parallel to the ground, from a kneeling position. If it dives, pull the wing forward slightly; but if it stalls, pull the wing back slightly. Keep up the gliding tests until the longest glide is obtained. Then

C. Wind the propeller till thirty turns are in the motor, and glide forward again. If the flight is of satisfactory appearance, put in sixty turns for the next flight, then 120 turns for the third flight, and on up by 25's until a completely satisfactory flight is obtained.

D. *Beware* when you begin to get near 800 turns!

E. Propeller torque is the tendency of the propeller to turn the airplane over in the direction opposite to the direction of the propeller itself. This may be overcome by shifting the wing to the side which wants to dip, thus giving a larger sustaining area to the dipping side. Some aircrafters raise that wing tip ⅛ in. higher, in order that the wind resistance will lift it up sufficiently to take care of the torque. Sometimes, also, the rudder may be shifted to overcome this tendency.

F. If there is a breeze, launch the airplane *into* the wind, just like real airplanes. Be sure to let the propeller go about two counts ahead of the actual tossing motion by the other hand, which holds the rear of the fuselage! Do not toss too hard —experience will indicate the proper strength of the tossing motion.

SLAB FURNITURE

W. Ben. Hunt, Hales Corners, Wisconsin

Tables

Rustic tables are usually made for outdoor use and therefore should be made of wood that will withstand the weather. For indoor tables, use the lightest wood to be found such as bass, pine, or some other light local wood. Tables are usually 30 in. high, while table-top sizes depend upon what the tables are to be used for, and the material that is procurable or on hand.

Table tops should be planed down quite smooth. They are usually finished with two or more coats of spar varnish. Figure 20 shows a table made from a single wide slab. (In the author's locality, a wide slab is about 20 in. wide and about 5 in. in the thickest part.) The table is made as though it were a bench, 30 in. high. The legs for such a table should be about 3 in. in diameter at the thickest end.

Figure 21 shows another single-slab table. The advantage of the lower structure of this table is that the legs will not sink into

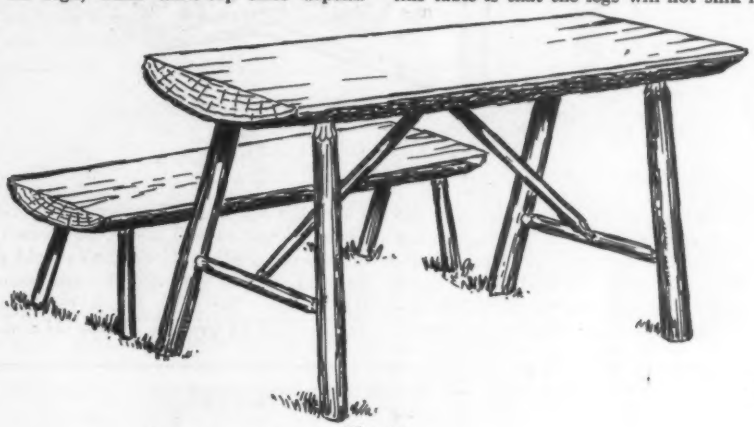


Fig. 20

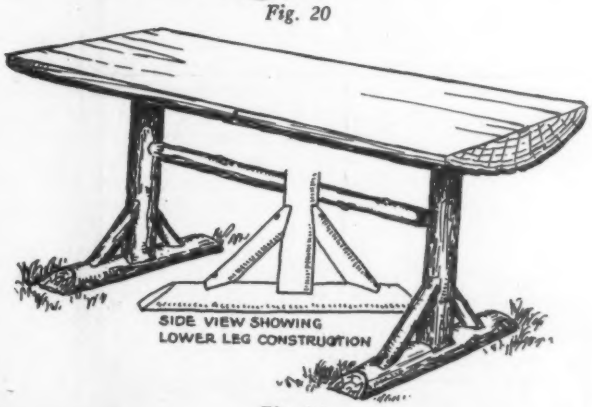


Fig. 21

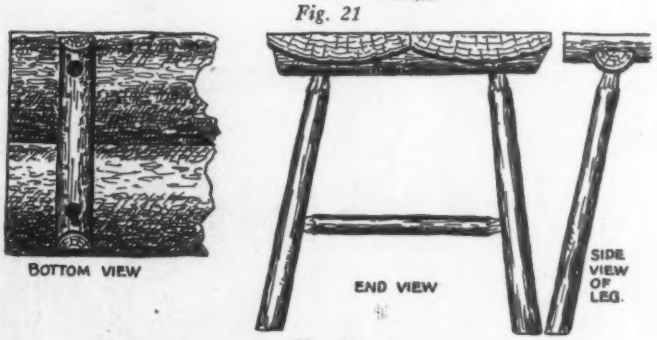


Fig. 22

Fig. 23

soft ground. The uprights are mortised into the top and set into the lower crosspieces. The crosspieces are logs split or sawed in half. The braces shown in the illustration may be fastened with nails or spikes as shown.

When a wider table is wanted, use two or three slabs for the top. To make a table

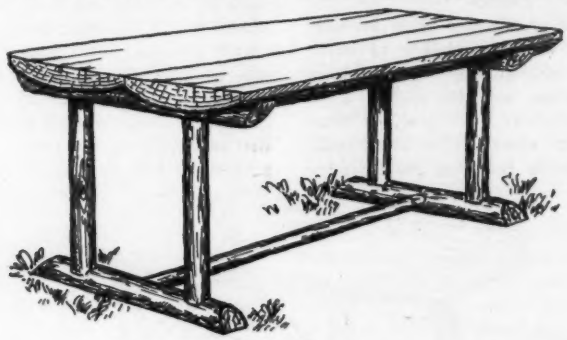


Fig. 24

of the type shown in Figure 22, plane the slabs to a smooth surface, and cut the edges square and straight. A piece of 4-in. sapling ripped down the middle will make satisfactory crosspieces. To fit the crosspieces, place the slabs, smooth side down, side by side, with the crosspieces in place. Mark the location of the crosspieces with yellow crayon. Saw along these marks to the depth shown in Figure 23, then cut out the dado with a wide chisel. Measure the remaining wood at each edge to make sure that the top pieces will be even. Before nailing the crosspiece in place, determine where the legs are to be placed and mark. Then proceed to nail, spike, or screw the crosspiece in place. If the top should not be even, a little planing will soon remedy the trouble. The table top is then ready to be placed on any sort of base. Figure 22 shows a simple method, using 3-in. legs.

For a table of the type shown in Figure 24, smaller saplings may be used for the legs. It will be found that 2 or 2½ in. will do nicely, with a 4-in. sapling for the lower crosspieces. Care should be taken in fitting this table together to get it an even height. A slight unevenness may be remedied by shaving off some of the bottom side of the crosspieces.

COLORING AND FINISHING COPPER AND BRASS

Wilbur C. Getz, East Aurora, New York

Beautiful shades of copper can be obtained in the school shop on articles made of copper, with little equipment and expense. These shades vary from the bright natural color to nut brown and green. For equipment, a few crocks, a tray, and a pan to heat and mix the solutions in is all that is required. Materials consist of steel wool, scouring powder, and the necessary chemicals as listed in the formulas.

It has been found advisable in our shop to do all the finishing of a period at one time. Demonstrations on the various finishes are given to enable the students to become familiar with the processes and

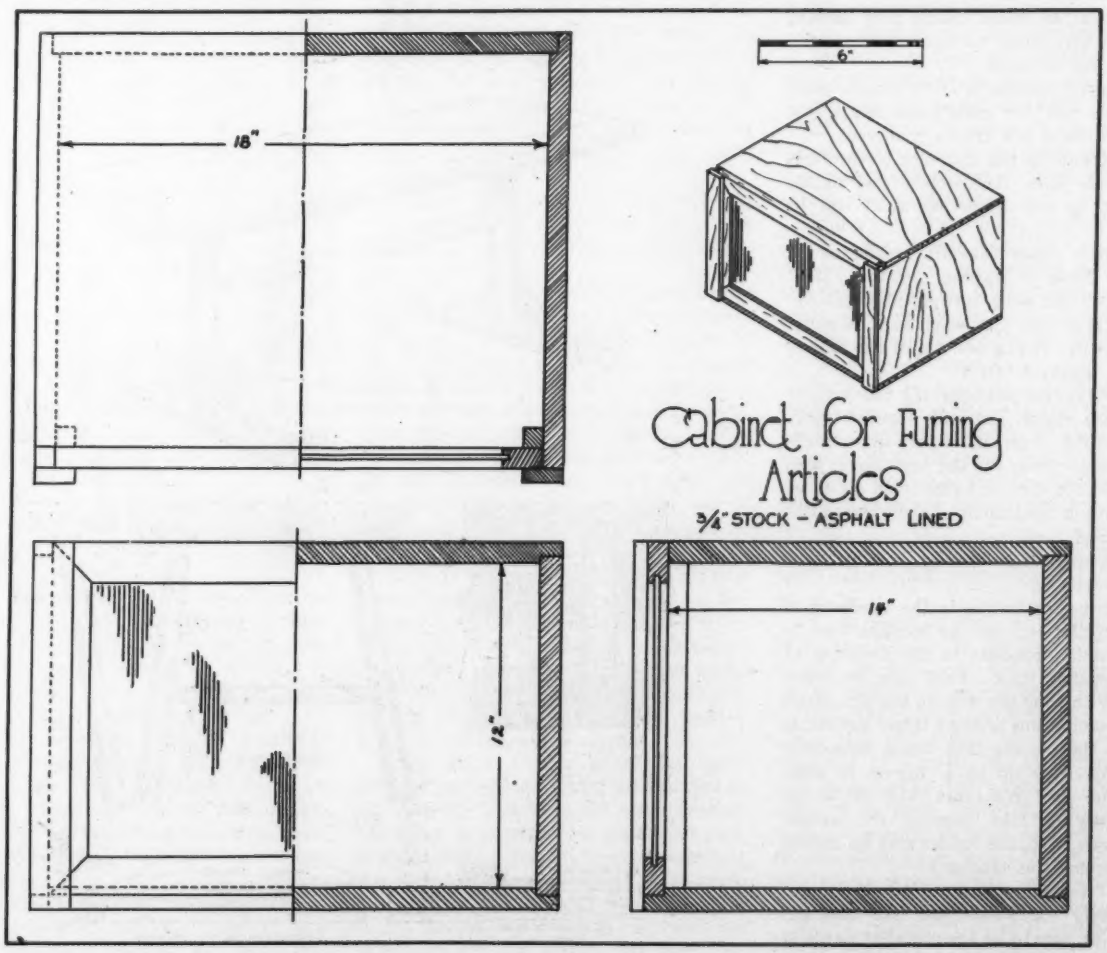


Fig. 1

shades. The solutions are then mixed up fresh and all work done in a few days. The boys mix up the required solutions either at the beginning of the period or in the morning before the school day begins, as better results are obtained with fresh mixtures, and the shades will be more even and beautiful. We have three finishing times per year, one prior to Christmas for the Christmas presents, one at the end of the first semester, and one in spring.

The first process is to remove the grease. A lye solution is used for this process as it is less dangerous than the cyanide solution. The lye is dissolved in boiling water with about a quarter of a can of lye to two gallons of water. The projects are dipped into the solution for about a minute and then washed off in water. After that, the projects are to be picked up by holding them only on the edges, and then only after washing the hands with soap to remove all grease and natural oil.

The second step is to remove the scale. This is done by immersing the project for a few minutes in a cold solution of concentrated sulphuric acid (1.84 gravity) one part to fifteen parts of water or the equivalent to one-half pint of acid per gallon of water. Then rinse in water and clean with scouring powder, using steel wool or a bit of cloth or a brush. Wash powder off with plenty of water.

The best all-round solution for coloring copper is potassium sulphide, 1 ounce per quart of water, mixed warm and used cold. Various shades can be obtained depending on time, temperature, and previous treatment of the metal. To set the color better, alternate dipping it first in the potassium-sulphide solution and then in a medium-strength solution of copper sulphate and water.

Bronze color on copper: Potassium sulphide ½ ounce, ammonium sulphide ⅛ ounce, water one gallon. Submerge article cold for a few seconds.

Pale gold to orange on copper: Sodium hydroxide (solid or flakes) 2 ounces, copper carbonate 4 ounces, water two quarts. Submerge article in hot solution. Time and temperature influence the color.

Brown on brass: Saturated solution of barium sulphide. Use warm. Submerge the project, first experimenting with scrap copper. Time and temperature vary the color.

Fumes are also used to give color to the projects. Although an ordinary box or crock will serve as a container to hold the fumes a regular fume box with window, shown in Figure 1, is far better. More satisfactory results can be obtained by watching for the exact shade desired and there is less danger of fumes escaping into the shop. The inside of the box can be coated with an asphalt paint to make the wood chemical proof. The best lining is obtained by coating the interior with gum rubber and then vulcanizing with a solution of 18 parts of sulphur chloride in 400 parts of benzine. Apply several applications with a brush until the rubber appears vulcanized and is hardened.

If the project is just set on the floor of the box the bottom will not tend to color. By driving three nails in a piece of scrap wood as shown in Figure 2, and setting the project on this tripod an even color can be obtained over the entire project. The chemicals should be placed in open dishes on two or more sides of the project. Designs can be worked in, by covering the project with adhesive tape, giving a two-colored effect.

Green on copper: Various shades can be obtained by exposing copper to the fumes of concentrated ammonia from 1 to 24 hours in a closed container as described in the foregoing.

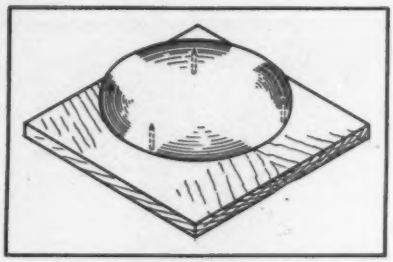


Fig. 2. Tripod for supporting articles to be fumed

Nut brown on copper: Expose to fumes of ammonium sulphide. Color depends upon exposure.

After the color is obtained, the piece can be left as it is with the even color, or it may be highlighted. In highlighting be careful not to remove too much color. Highlighting is done to produce a contrast. To produce this effect, take a piece of wet, fine steel wool, dip it into powdered pumice stone or scouring powder, and rub the portions which are to be highlighted in a circular motion. The project is then washed off, dipped in hot water and dried.

If the project consists of two or more parts, air should be blown on the joints to force the water out, as the project must be thoroughly dry to take a good finish.

On some projects a coat of wax is sufficient as a finish, but the best is clear lacquer, preferably sprayed on. By thinning the lacquer it can be blown on with a mouth blower. The lacquer also may be brushed on. The project should be thoroughly dry before being picked up so there will be no finger prints showing on the surface. If felt is desired on the bottom, shellac the place where the felt is to go, let the shellac become sticky, and then press the felt into place. Having the felt larger than the section it is to cover, and trimming it after the shellac is dry is best, as it gives a tighter edge.

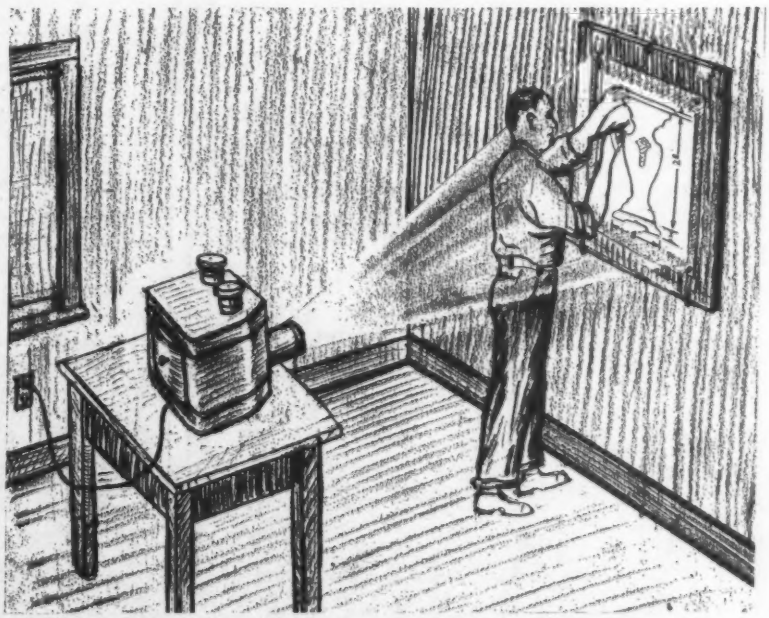
ENLARGING DRAWINGS WITH OPAQUE PROJECTION LANTERN

Jos. J. Lukowitz, Milwaukee, Wisconsin

Exact enlargements of any drawing may be made by simply projecting the drawing with an opaque projection lantern and then drawing the outline as shown in Figure 1.

Projection lanterns of the type illustrated in Figure 1 can be purchased for a very nominal price. Anyone wishing to construct his own lantern will find complete drawings and instructions for the making of a reflectoscope, which is an opaque projection lantern, on page 323 of the October, 1934, issue of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine.

Some schools have an opaque projection



Using a projection lantern for enlarging drawings

lantern for use in the academic department for the projection of maps, pictures, and the like. These lanterns are, of course, well adapted for enlarging drawings. With some of these lanterns it is not necessary to cut a drawing or illustration from a book. The book can be inserted into the lantern and maneuvered so that the illustration or drawing to be enlarged will be projected.

To enlarge a drawing of a project from a book or magazine with such a lantern, it is best to cut the part of the page containing the drawing and insert it in the lantern or trace the outline on tracing paper and insert the tracing in the lantern. While these lanterns are designed to project post-card-size pictures, and are provided with a slide to accommodate pictures of the size of a post card, nevertheless, clippings to be projected need not be of post-card dimensions. Smaller clippings may be held in the lantern by first inserting in the slot a piece of mica and inserting the clipping behind this. Hardware stores usually carry a stock of mica for use in old-type heating stoves. Films should not be used for this purpose, as the heat from the electric bulbs may ignite them.

The lantern shown in Figure 1 reverses the picture or drawing that is, the right is projected to the left and the left to the right. This, of course, is immaterial because most designs used in the shop are bisymmetrical. Those designs having detail which must not be reversed may be projected onto tracing paper and then reversed to their original position by turning the tracing paper over.

SOLDERING TRAY

Thomas E. Houston, William Barton Rogers School, Hyde Park, Massachusetts

The tray described herewith, was designed in order to keep the soldering acid, soldering paste, salammoniac block and loose solder all in one container. It has been found to be not only a great convenience but an absolute necessity in keeping the soldering bench neat and orderly.

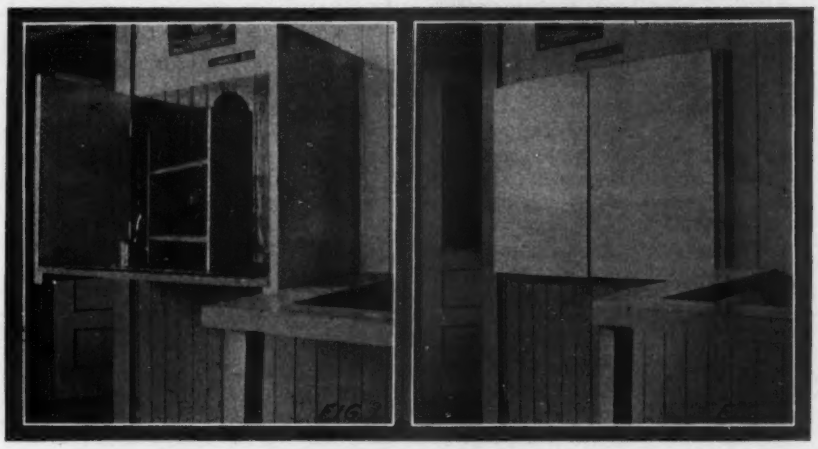
The tray (A) is made of black iron and is left bare. The corners of the tray and the salammoniac block holder (B) are fastened in place with No. 1 f.h. rivets. The soldering-paste holder (C) is clinched in place with lips that extend through 3/16-in. slots cut through the bottom. Glass inkwells are used for acid jars and are supported in place in the soldering-paste container by a cast lead ring (D) or, if it is preferred, a separate container is made to fit the inkwell, and clinched in place.

The lead rings may be cast in a wooden form (E) turned in a lathe to the correct size and shape.

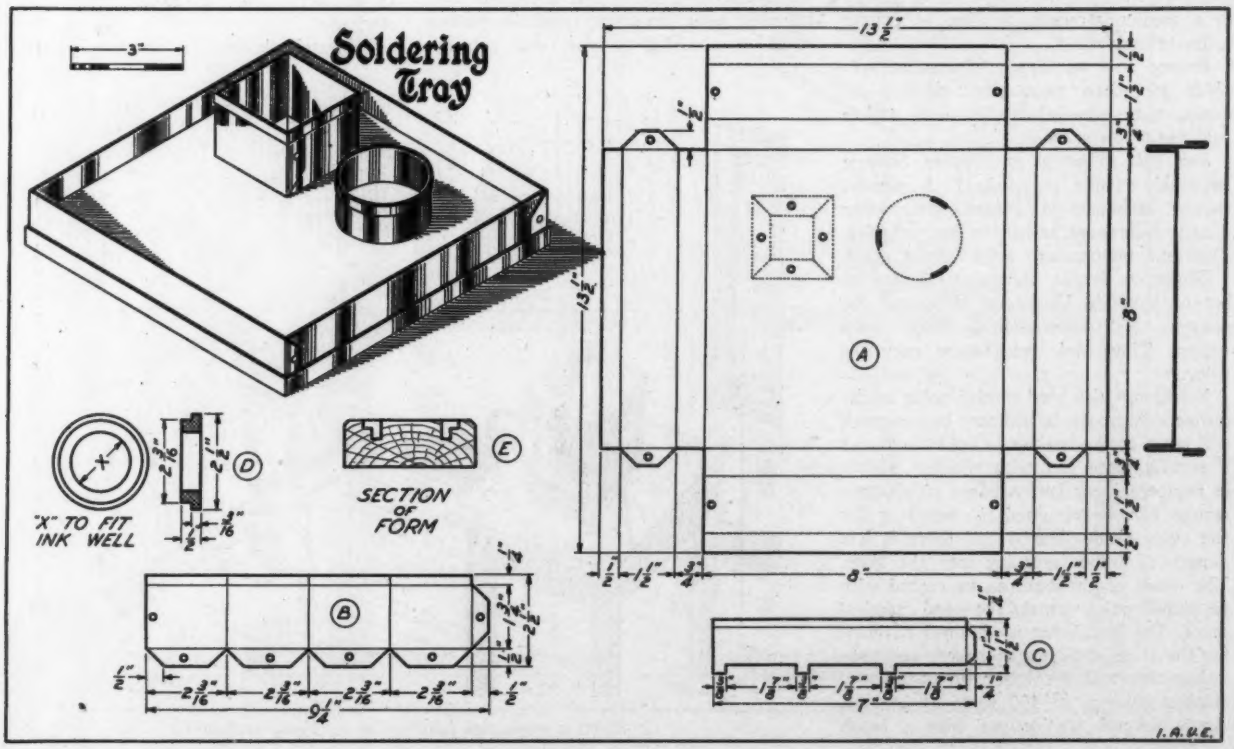
A FOLDING FINISHING BOOTH

J. Edward Bond, Bayville, New York

School shops too small to permit the luxury of a separate room for finishing will find the folding booth illustrated and described in Figure 1 very helpful.



The folding finishing booth



INDIAN NECKLACES

PLATE BY W. BEN. HUNT, HALES CORNERS, WIS, 1936

Enlarged drawing of horse teeth that may be whittled from any close-grained hardwood such as birch, apple, hawthorne, etc.

First cut away half of a ⅞" branch. Then whittle the root and next the tooth itself.

Horse front teeth are very much like human front teeth and are about 1¼" to 1½" long by ½" to ⅝" wide at the widest part. After whittling, rub smooth with sandpaper and give them two coats of white enamel. Hang them on a wire to dry. Then discolor them with walnut stain and when almost dry, polish with a piece of cloth. String as shown.

Imitation bone beads may be made by using cane pipe stems cut to length and whittled to shape. Small ash twigs also may be used. Remove the pith with a piece of wire. Give wooden beads a coat of linseed oil and then polish.

Bone beads may be made from the small bones of chicken, duck or goose wings. Boil them until they are white. Cut into lengths and file to the shape shown here. Polish by rubbing with a coarse cloth and linseed oil.

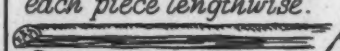
BEAR CLAW A

EAGLE CLAW

ROOSTER SPUR B

"Bear claws" also may be made of wood ① Cut branches of green ash, hickory or any other hard wood, about ¾" to 1" in diameter and about 12" long. ② Peel the bark off

and cut away half of each piece lengthwise.

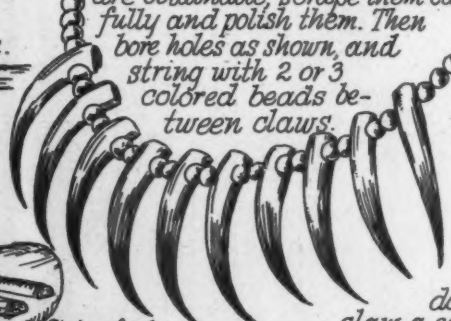


③ Then bend them slowly & carefully a little at a time, over a piece of limb about 2" in diameter and tie as shown below.

Flat side to the inside.

Strips of ash may be steamed and bent in this same manner.

Indian necklaces made of bear claws or eagle talons are very much alike, but both these claws have become quite scarce so we must look for ways and means of imitating them. Spurs from some roosters B make excellent imitations but they are also difficult to obtain. If rooster spurs are obtainable, scrape them carefully and polish them. Then bore holes as shown, and string with 2 or 3 colored beads between claws.



④ Hang in a dry place for a couple of weeks, or until thoroughly dry and then whittle the claws from the bent portions.

At A is shown how a bear claw is shaped. The under side of the claw is hollowed somewhat but for our purpose it may be left flat. The upper or outer side should be nicely rounded. After whittling to the proper shape, scrape or sandpaper them as smoothly as possible. Bore a small hole about ⅛" or 3/16" from the thick end.

Then char the point very carefully over a small flame to about the center of the claw. Rub down carefully and give the whole claw a couple of coats of boiled linseed oil, and rub down with coarse cloth.

The natural color of bear claws is black at the points, blended gradually thru gray to a grayish tan.

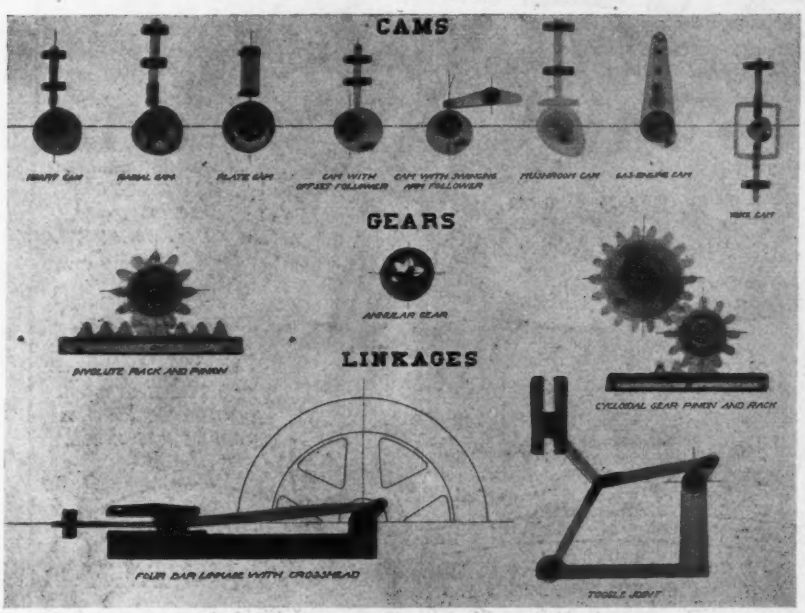
The shelf of the booth is hinged to fold flat against the wall. The two sides of the booth, also hinged, support the work shelf when in use and act as doors when folded as shown in Figure 2.

Supplies are kept in a steel cabinet placed close enough to the finishing booth so as not to cause any inconvenience in transferring supplies from storage cabinet to finishing booth.

WORKING MODELS FOR THE DRAFTING ROOM

Val H. Aurit, Horace Mann School, Gary, Indiana

Every instructor of mechanical drawing appreciates the value of models in teaching his subject effectively. Working models



Working models for the drafting room

are almost indispensable for teaching cams, gears, and linkages. It is difficult, however, to get models of this kind, which are not too cumbersome for use in the drafting room.

The panel board shown herewith is an attempt to solve this problem. Thirteen working models are mounted on it, illustrating eight types of cams, cycloidal and involute gears, and the two most common forms of linkages. It was constructed almost wholly from worn-out drawing equipment. The total cost of the panel was less than one dollar.

The board on which these models are mounted is an old 30 by 42 in. drawing board. It is covered with paper, and put into wood frame.

The working models were cut out of worn-out triangles and riveted with common pins. Celluloid triangles are very easily worked into any desired shape with a pair of shears and a fine rasp or file. The knurled grips of worn-out compasses make excellent cranks for these models.

CIRCLE OR WHEEL CUTTER

Leonard Wright, Jersey City, New Jersey

If a number of flat, round disks of wood are needed to make wheels of toys for instance, a way of making them accurately and rapidly is to use the circle cutter described herein.

This circle cutter is used in connection with a lathe. It cuts disks from any kind of wood, solid or laminated, or holds the wood in the lathe as on a faceplate so that it may be worked with a chisel to any desired shape.

If it is desired, for instance, to cut 4-in. diameter disks from ½-in. poplar, select a board of a width that the circles will fit staggered to eliminate waste. If a thicker board is used, say one that is ¾-in. thick, it is better to lay out the circles carefully first, and then bore each center hole with a hand drill and as each circle is partly cut through on one side of the board, it is turned over and the center hole used to guide the cutting of the circle through the board. A different size cutter must be used for each size disk desired. The limits of large and of small diameter is governed by the size of pipe one is able to secure to make the cutter. For the larger size disks, 6 in. and up to the capacity of the lathe, it is better to use a small cutter as the holder of the large piece of wood to be turned round as a disk, placing it between the cutter and the tail-stock center.

The cutter is made on a machine lathe, although it may be managed on a wood lathe with much care. Figure 1 shows a 4-in. cutter. To make it, secure a piece of 4-in. wrought-iron pipe about 2¼ in. long. Hold it in the chuck and true both edges until it is 2 in. long. Then remove a thin cut from the inside, just enough to true the inside diameter which is approximately 4.026 in. Then turn down the outside diameter, until the metal is 1/16 in. on the rim for a distance of ⅝ in. leaving the rest for strength. Cut the teeth with a three-cornered file and be sure that the teeth point counter-clockwise or in the di-

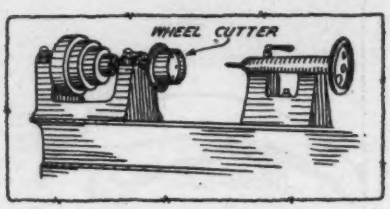


Fig. 2. The wheel cutter mounted on the lathe

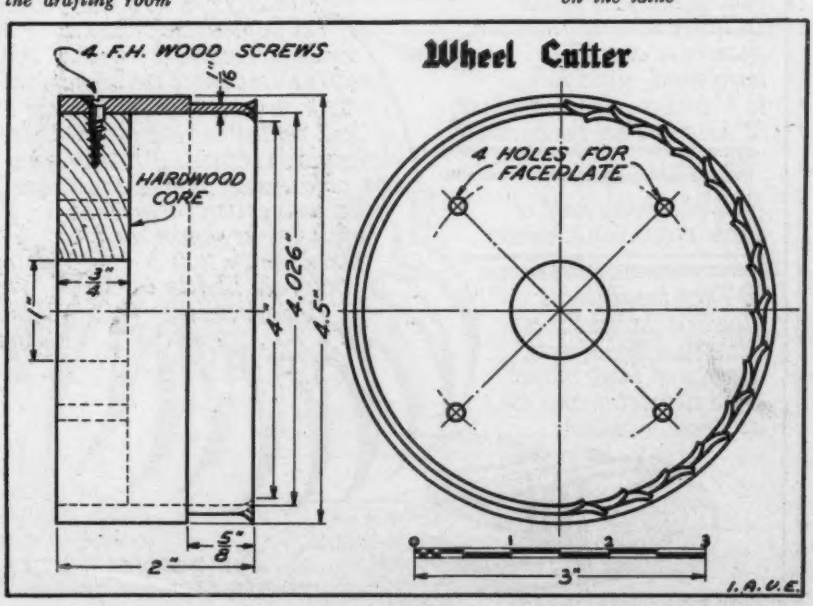


Fig. 1. Details of the wheel cutter

rection that the lathe rotates. Now set every other tooth in toward the center of the cutter with a cross-peen hammer, so that the distance from one tooth set in to the diametrically opposite tooth set in is 4 in. The other teeth are set outward just enough for good clearance, and then all the teeth may be touched again with the file.

Inside the cutter a hardwood disk is fastened to the rim with four flathead screws. This hardwood disk has a 1-in. hole through the center, and also holes for fastening to the faceplate of a wood lathe. If a metal lathe is used the cutter is simply held in the chuck without the hardwood core.

To cut circles, select the proper thickness of board for the disks to be cut. Place the board between the motionless cutter and the tailstock center turning the center up to the board and impressing it into the wood. Start the lathe holding the board firmly with one hand and turning the tailstock center into the wood with the other, thus forcing the cutter to enter the wood and cut the disk. Do not force the center too rapidly or the cutter will choke and burn, or the cutter may break through the wood too rapidly and cause a splintery edge on the disk. If the disk sticks inside the cutter, poke a long thin rod through the headstock and force the disk out.

There are two ways of boring the center hole through each wheel for an axle. The tailstock center of the lathe has pressed an indentation in the exact center of each wheel as it was cut. Now a Jacobs chuck with a short drill, the size of the axle on which the wheel will turn, is placed in the tailstock of the lathe and by using a smaller cutter than the wheel size, each wheel may be placed against the motionless cutter, the drill in the tailstock then brought to center of the wheel and starting the lathe, the turning of the tailstock drill into the revolving wheel, will bore the hole. The other way is to use a drill the size of the axle, in a hand drill and hold each wheel in a vise while the hole is bored on the spot made by the tailstock center when the wheel was cut.

The disks may be sanded by returning them to the lathe with a smaller cutter turning them on the center. Then, too, with a formed tool, the outline of a tire as of an automobile wheel may be made on one or both sides of the disk.

This method of plate turning with the cutter and center eliminates fastening the piece of wood to a faceplate, although this method is not quite as rugged as if the disk were so fastened. Trays and gear blank patterns are more easily turned by this method because of the ease with which the piece of wood may be turned over to work the other face.

The cutters, while made of wrought-iron pipe only, and not of a good grade of tool steel, will last a considerable time before they need resharpening. It also is possible to have the cutters casehardened to make the cutting edges of the teeth last longer.

PORTABLE STORAGE BOXES

F. B. Miller, Central High School, Tulsa, Oklahoma

The problem of storage space is one that is constantly before shop teachers, particularly where lack of funds prohibits the construction of extensive cabinets and storerooms. Faced with the problem of caring for generators, starters, and the like, in an auto-mechanics shop, and also with the waste space under benches, the storage boxes described herewith provide an economical storage medium that has proved most satisfactory. This system will work equally well in other shops.

The boxes are built of a uniform size to fit storage needs and the space available for the boxes. As the articles to be stored were quite heavy, ¾-in. material was used in their construction. To avoid damaging the boxes by dragging them over the floor, salvaged ball-bearing sets were driven onto turned wooden axles and used as wheels beneath the boxes. To lock the box, and also to keep the boys from trying out its rolling qualities excessively, a hasp hung from the bench apron swings down over the staple, and is secured to the front of the box with a padlock.

The illustrations show boxes which happen to suit the needs in the author's course. These boxes measure 17 by 18 by 26 in. inside. They are made of second-grade lumber bought at 5 cents per foot, and cost approximately $1.50. The simplicity of construction lends itself readily to an easy production job for a millwork class. Angle iron would be an improvement over the wooden strips in the inside corners, but would add to both the cost and the work of construction.

Portable storage boxes

GAS WASHER

George C. Donson, Washington, Pennsylvania

We experienced much difficulty in keeping the soldering coppers clean in our general shop. The copper would be in good condition for work, but in a few minutes it would be coated with soot, although not overheated. We eliminated this trouble by making a gas washer. The washer consists of a piece of ¾-in. iron pipe about 5 in. long, which is filled with hog hair and cotton. The ends are screened to keep the cotton and hog hair in place. A fitting ¾ by ½ in. is then screwed on each end of the pipe and the device is ready to be placed in the gas line. The filling is good for at least two years, depending on how much the furnace is used. Gasoline may be used to clean the filling or the washer may be refilled with new material.

DRESSING A CARBORUNDUM STONE

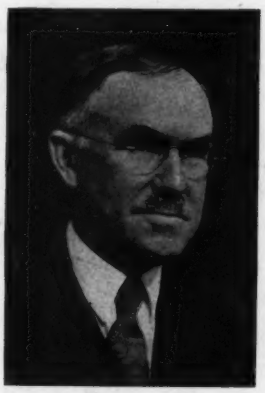
Frank Cerveny, Crane Technical High School, Chicago, Illinois

An easy and fast method of dressing such a stone is first to heat it over a hot plate to burn out the accumulated oil and get the stone perfectly dry. Then, using a flat cast-iron plate or surface, and carborundum grit or crystals, rub the stone to a true surface. Sprinkle a little grit at a time on the iron block. As the grinding proceeds, the dust worked off the stone hinders further fast grinding, so wipe off the accumulated dust and carborundum crystals and start anew. By this method a stone with a hollow of 1/16 in. or more can be trued up in from five to ten minutes. A medium-sized grade of carborundum grit is used. It can be obtained at most large hardware stores.

Personal News

ASSUMES ADDITIONAL RESPONSIBILITIES

The recent appointment of Mr. Harry E. Wood to the position of Director of Art in the Public Schools of Indianapolis, Ind., combines in one person the supervision of the instruction in art, practical arts, and vocational education.



HARRY E. WOOD

Mr. Wood, by education, experience, and inclination, is admirably suited to cover the wide field assigned to him. His past record as teacher, director, teacher trainer, author, illustrator, and leader in educational associations, is a guarantee that the high trust placed in him has not only been deserved, but is fully justified.

Association News

MEETING OF THE MASSACHUSETTS INDUSTRIAL-EDUCATION SOCIETY

The annual club meeting of the Massachusetts Industrial-Education Society was held on June 6, at Seiler's "Ten Acres," Wayland, Mass. Since it was the final meeting of the season, a program of outdoor recreation was combined with it.

Following the dinner, a short business meeting was held, with President Louis A. Van Ham presiding. The following officers for the next year were elected: President, Louis A. Van Ham, Mattapan; vice-president, Herman Pohlman, Newtonville; secretary, Edward Terrenzi; treasurer, Gustave Larsen; librarian, Arthur Robinson. — *A. Irving Dodge.*

CENTRAL CONNECTICUT INDUSTRIAL-ARTS TEACHERS MEET IN HARTFORD

The summer meeting of the Central Connecticut Industrial-Arts Association was held on June 5, at the Chippanee Country Club, in Bristol. A supper was served at six o'clock. Miss Herbert, of the Bristol School, was in charge of the program, which included music, singing, and dancing.

The President introduced Judge Newell Jennigs, the speaker of the evening, who talked on the need of expansion of industrial-arts work in the secondary schools of the country. Dr. Herbert Welte, principal of Teachers' College, New Britain, in an inspiring talk, discussed the topic "Success and What It Means." He emphasized that success in life does not mean a college education, but the ability to get happiness out of whatever may be one's lot in life. Karl A. Reiche, superintendent of Bristol School, took for his subject, "Believing in One's Self," emphasizing that industrial-arts teachers must have confidence in themselves and their work in order that they may enlighten the public regarding their important contribution to education.

President Giammatteo presided at the business session. A committee was appointed to arrange for the next meeting in November. Six keymen in different localities were appointed to promote interest in the meetings and encourage attendance. A committee was appointed to make arrangements for the teachers' convention-day program. — *Harry A. Barnicle.*

THE SOUTHEASTERN INDUSTRIAL-ARTS CLUB MEETING

Teachers of Rockland and Orange counties, New York, met at the Warwick High School, Warwick, N. Y., on June 4. Twenty persons attended and were welcomed by Mr. Smith, principal of the school.

Following the dinner, President Chevelle opened the meeting, which was devoted to problems of interest to shop teachers.

Mr. Gordon Baker, the host, who is in charge of the general shop in Warwick, showed some fine examples of metalwork.

Mr. Fred Pelin, Newburgh, was appointed chairman of the program committee, Raymond Van Tassell and Oscar Rickey serving with him.

The following officers were elected for next year:

President, Mr. Ellis W. Thorpe, Newburgh; vice-president, Mr. J. R. Watkins, Newburgh; secretary, Mr. Gordon Baker, Warwick; treasurer, Mr. C. E. Tooker, Monroe. — *J. R. Watkins.*

NEW VOCATIONAL-SCHOOL PLAN FOR NEW YORK CITY

The school officials of New York City have received an outline of a new plan which has been proposed for extending and radically revising the existing vocational-school organization within the next five years. The purpose is to provide an intensive program of vocational training for the semiskilled, as well as the highly skilled trades.

Under the program, which has been prepared by Mr. William E. Grady, associate superintendent of schools, a number of new trade schools will be established. Existing trade, industrial high, vocational, homemaking, commercial, art and craft schools, including those now called continuation schools, will be placed on a recognized vocational-high-school basis.

Many of the present vocational or industrial schools will be renamed and their scope limited.

The new type of trade school will offer specialized training in the tenth, eleventh, and twelfth grades, while the ninth grade is planned as a further exploratory course and guidance program for those pupils who have elected vocational training. All instruction will be on a six-hour, eight-period-per-day basis, in contrast with the former five-hour day.

Three types of courses will be offered in the new vocational schools: vocational industrial, vocational commercial, and general vocational. In all three, pupils will be required to complete the ninth-year or exploratory course, before embarking upon specialized training.

New Publications

Metalwork Essentials

By F. E. Tustison and Ray F. Kranzusch. Cloth, 6 by 9, 176 pages, illustrated. Price, $1.50. Published by The Bruce Publishing Company, Milwaukee, Wis.

This book is especially adaptable for beginning courses in metal work. It is therefore admirably suited to the general shop. In it are presented especially the hand-tool manipulations, such as cutting, shaping, forming, fastening, and finishing. The projects shown can all be made with hand tools and with little equipment. There are 32 units, each one of which contains a brief paragraph of necessary information as well as a number of questions for study and discussion.

The descriptions are brief and to the point and the illustrations are excellent.

Problems in Machine Drawing

By Rufus B. Felten. Cloth, 10 by 8¼, 186 pages, illustrated. Price, $1.90. Published by McGraw-Hill Book Co., Inc., New York City.

This is a transition course to tide the gap between machine drawing and machine design. It is divided into four parts, the first one dealing with the elementary principles of machine drawing, the second with machinery fastenings, the third with mechanisms of power and motion, and the fourth with motors and machines.

Occupations and Vocational Guidance

By Wilma Bennett. Paper, 8½ by 10¾, 85 mimeographed pages. Price, $1.25. Published by the H. W. Wilson Company, New York City.

This bibliography is a buying list and index of pamphlets on occupations and vocational guidance for the use of guidance workers, librarians, shop teachers, social workers, and the like.

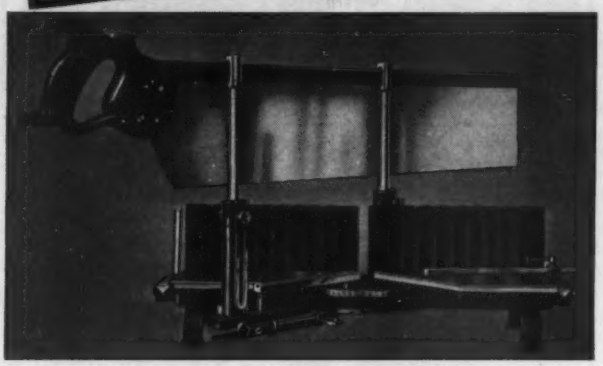
Dictionary of Modern Type Faces

By William Longyear. Paper, 7 by 10½, 140 pages. Price, $2.50. Published by Bridgman Publishers, Inc., Pelham, N. Y.

A collection of type faces representative of the past as well as of the present. The author has avoided including some of the extremes shown in some of the new type faces. The

(Continued on page 6A)

—and now BALL BEARINGS



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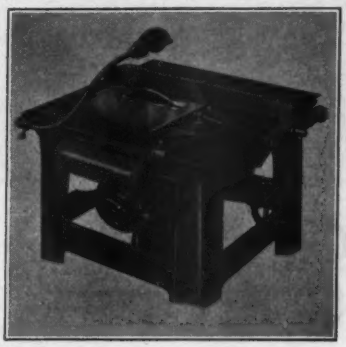

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(Continued from page 258)

book contains about 160 different styles, ranging from heavy poster to the light graceful faces, and embraces both the classic and the modern.

Hand Book and Instructors Manual

By Ray L. Martin, George H. Fern, and L. A. Woods. Paper, 8½ by 10⅞, 180 mimeographed pages. Published by the Texas State Board for Vocational Education, Austin, Tex.

The book is divided into five sections arranged in the form of job sheets. Section I is on "Housekeeping" and contains 43 job sheets; Section II, "Heating System," 20 lessons; Section III, "Repair Work," 29 lessons; Section IV, "Yard Work," 7 lessons, and Section V, "Safety," 2 lessons. The book also contains a comprehensive bibliography.

Teacher Training

By J. C. Eddie, J. H. Lawrence, K. K. Porter, edited by H. W. Paine. Cloth, 139 pages, 8½ by 11¼. Published by State Board for Vocational Education, Trades and Industries, Columbus, Ohio.

An outline of courses of study for the auto-repair trade. Contains besides the analysis, the outline of an auto-repair shop course, together with definite listing of related theory, construction, science and materials, and mathematics.

School-Shop Equipment News

CRAFT NEWS

The Wrot Iron Designers, 541 West 35th Street, New York City, have issued a second edition of their "News From All Five Departments." This news bulletin describes fully the services which the Wrot Iron Designers offer the teachers of school shops.

This firm can furnish the teacher of the metalwork shop not only with metal in the forms of bars, sheets, and tubing, but also offers a large variety of hardware, hard-to-get material, finishing and polishing material, tools, etc. Besides this, the shop teacher can obtain designs, job sheets, and kits of material, publications and textbooks, and assistance in special designing.

In addition to this, the firm also offers a series of teacher's courses both in wrought iron and art metal, embracing shop practice, essential theory, and the elements of design.

NEW CATALOG OF FINE CABINET WOODS

Albert Constantine & Son, Inc., 797 East 135th St., New York City, through its homecraft department, has issued a 40-page catalog, illustrating its line of fine cabinet woods, inlays, veneers, plywoods, moldings, and other supplies needed for the construction of furniture and other wood projects.

Besides the foregoing information, the catalog contains interesting facts on veneering, and the making of inlaid pictures, and information about glue. The book also contains a bibliography of books on woodcraft and describes the projects-service bulletin issued by this company.

ATKINS RECEIVES UNIQUE RECOGNITION

The E. C. Atkins Company, saw manufacturers of Indianapolis, Ind., have been known for their heat treatment of steel and are often called upon by famous drivers in automobile races for special heat treatment of vital parts of racers. The advice given to the drivers and race officials by Atkins, the thorough heat treatment of car parts in the Atkins factory, and the precise knowledge of metal problems which the officials of this company have, prompted the Contest Board of the American Automobile Association to appoint Mr. W. R. Chapin, research engineer of the Atkins Company as speedway metalurgist.

The Atkins Company imparts this same kind of everlasting thoroughness to the heat treatment and manufacture of all of the products which they make.

ISSUE NEW CATALOG OF CRAFTSMEN SUPPLIES

The Craftsman Wood Service Company, 2727 S. Mary St., Chicago, Ill., has issued its latest *Craftsman Book No. 8*, giving useful information and descriptions of hard-to-find materials, hardware, and tools.

The booklet, which is intended for the use of professional and amateur craftsmen, and teachers of industrial-arts classes, lists assorted fine lumber and turning squares, rare and fancy woods for inlaying and marquetry, inlays, fancy veneers, useful shop tools, period designs, picture-frame moldings, and cabinet hardware.

A copy of the booklet will be sent to any shop instructor upon request.

MR. HEITKAMP JOINS AMERICAN TYPE FOUNDERS COMPANY

Mr. Frederick B. Heitkamp has recently joined the executive staff of the American Type Founders Company at Elizabeth, N. J. He was formerly vice-president in charge of sales for the Lyon Metal Products Company, at Aurora, Ill., and has been active for many years in the school sales field.